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WAR MACHINE

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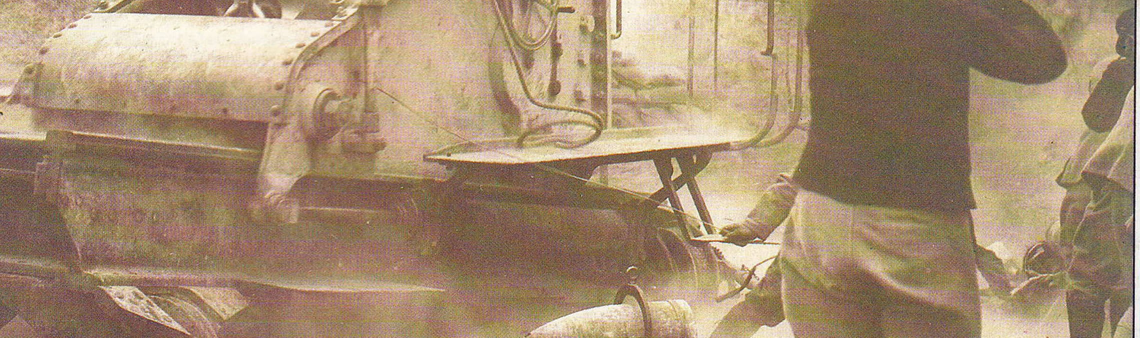
Verdun 1916

The Paris Gun

Moving the Big Guns



A fully illustrated guide to Heavy Artillery of World War I

WAR MACHINE

Volume 5 Issue 56

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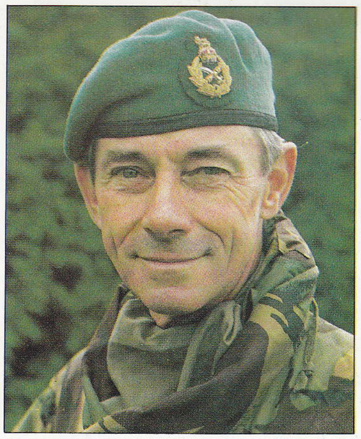

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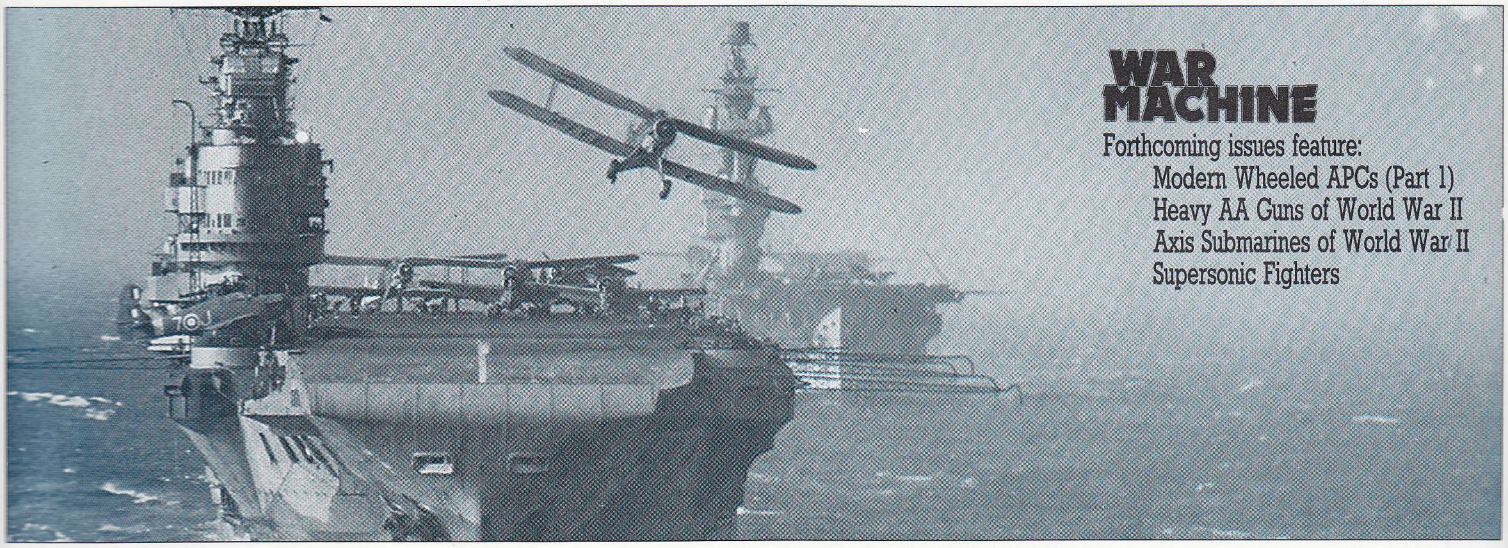

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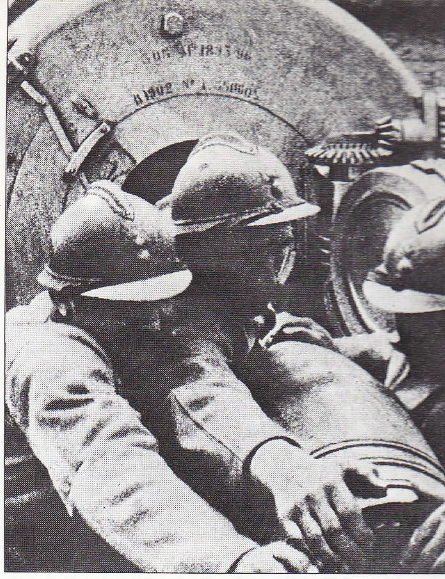


Heavy artillery of World War I had few mechanical aids for handling heavy ammunition. Particularly on the older models, shells weighing over 1000 kg (2205 lb) would have to be manhandled into the breech, as happened with this French 400-mm equipment.

To the sentry standing his pre-dawn duty in the trenches of the Western Front, the sight of a jagged line of light on the opposite horizon cannot have been comforting, for behind such a line lay the fire of the largest concentration of artillery pieces in history.

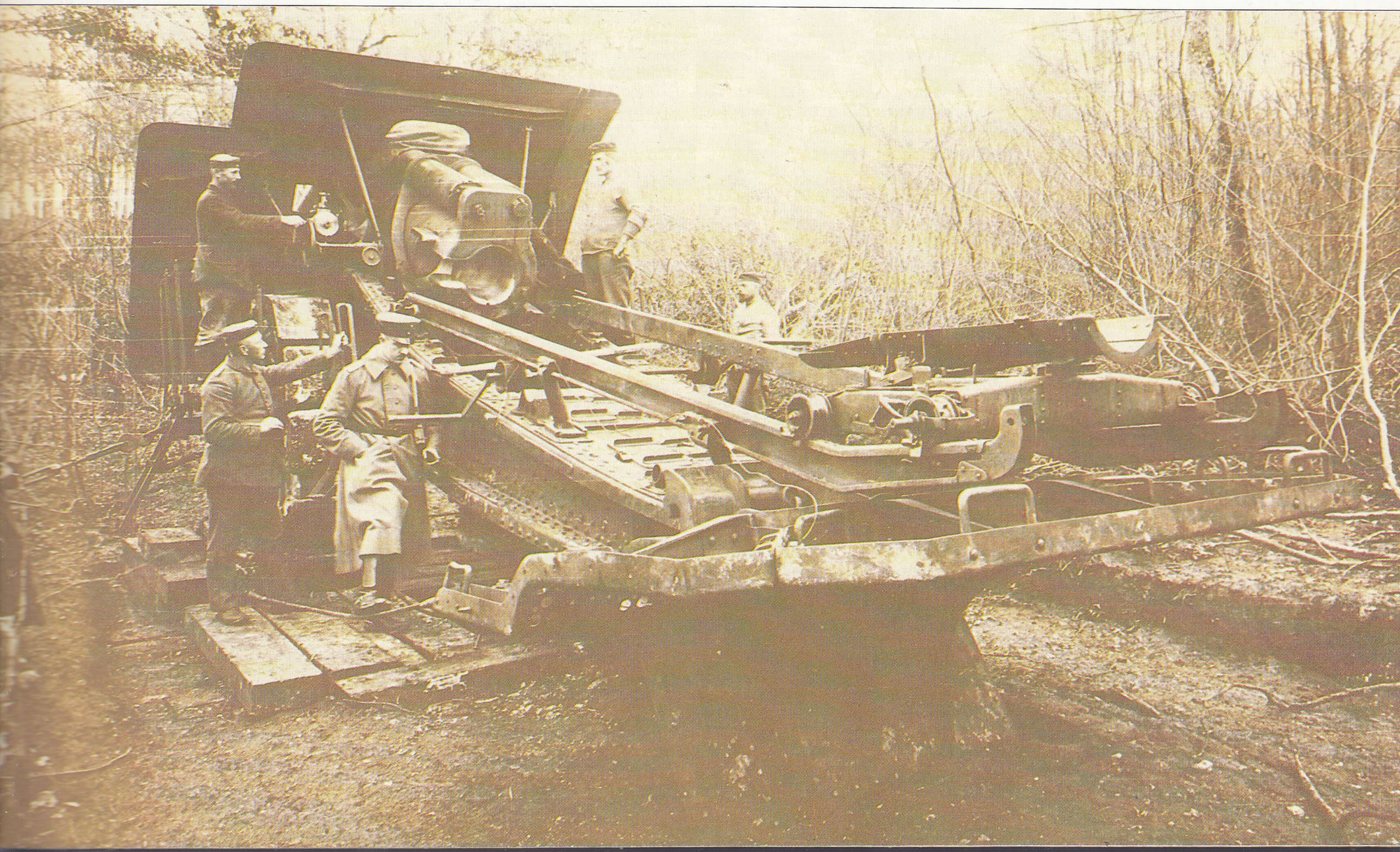
World War I was an artillery war and, while large numbers of field guns were involved in all the major battles of that conflict, it was the heavy artillery that ultimately won or lost battles. It was only the heavy artillery that had the shell power to destroy the earth or concrete protection upon which each side came to rely for survival in the front line, and it was only the heavy artillery that could smash a way through the lines of defences behind which each side sheltered.

By 1914 most European powers had built up large gun parks that contained artillery of increasingly heavy calibres and power. These were necessary to demolish the rings of fortifications that all the major powers used to protect their territories against the intrusions of others, but once those fortresses had been bypassed by the events of the first year of the war the same heavy artillery was equally useful in the strange conditions of the Western Front, where trench lines imposed their own peculiar method of warfare.

This short survey cannot include all the many and various models of heavy artillery that were used during World War I. What has been attempted is a general indication of the many types involved, and included here are some of the models that might be considered the most important. Thus the Paris Gun and 'Big Bertha' are included along with the British 234-mm (9.2-in) guns and 305-mm (12-in) howitzers, but weapons such as the German 21-cm (8.27-in) mortars have had to be left out for space reasons. Space has been found for some of the smaller examples of heavy artillery, such as the British 152-mm (6-in) howitzer and the German 15-cm (5.9-in) Kanone 16, but the main emphasis is on the really heavy weapons, for it is they that now attract the most attention and interest.

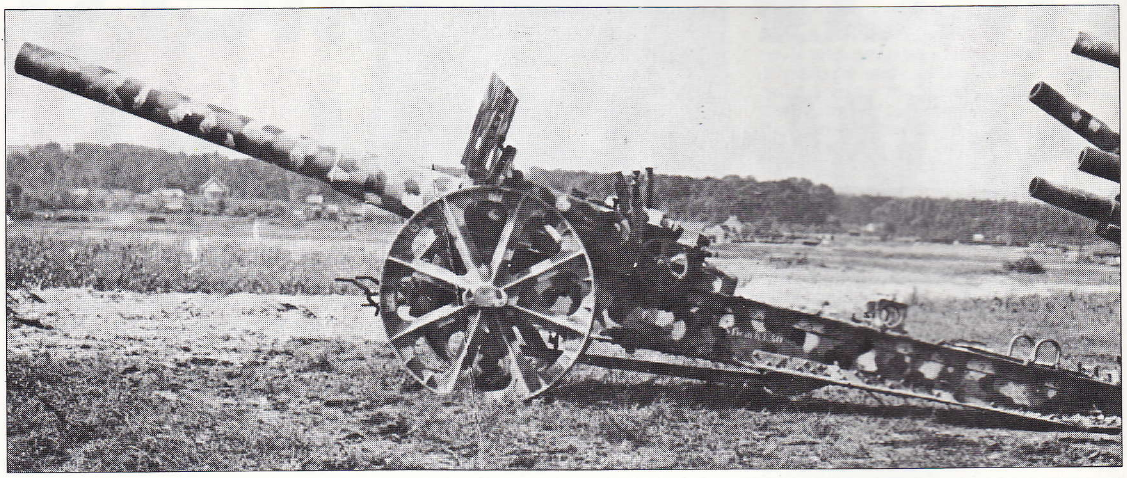
The 'Great War' was the heyday of heavy artillery. In the purely static conditions that existed along the Western Front the heavy guns and howitzers could be carefully emplaced with few thoughts of dramatic or rapid moves, and they could be fed with their heavy projectiles for as long as the required logistic machinery remained in being. They had plenty of targets as each side burrowed deep into the earth to survive the storm that daily flew over their heads. The only way to harm such burrows was by the use of heavy projectiles that could smash their way through such protection as there was, and these heavy projectiles could only be delivered by the heavy artillery.

Once the war had settled down to a face-to-face confrontation between deeply entrenched forces, the howitzer came to the fore as the main offensive weapon of the various artillery arms. The monstrous 42-cm M-Gerät (known as 'Big Bertha') was used by the Germans at Liège and Namur.



GERMANY

15-cm Kanone 16



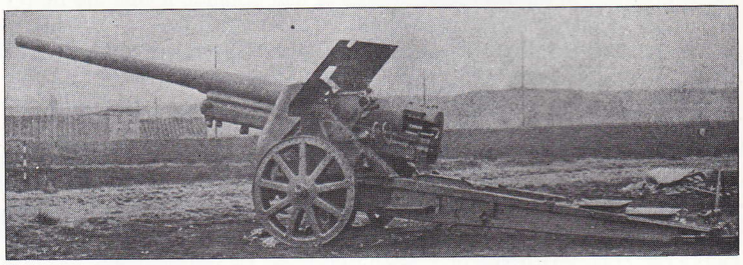
Above: In contrast to most of the artillery involved in World War I, the German 15-cm pieces were not howitzers. With their long range, the weapons were feared in the counter-battery role, and could only be opposed by much larger and less mobile Allied weapons.

The inclusion of a gun with a calibre of only 150 mm (5.9 in) may seem out of place in a description of heavy artillery, but the German 15-cm (5.9-in) guns were really in a class above that of normal field artillery. Quite apart from their size and weight, they were intended for use as corps artillery capable of long-range counterbattery and 'interdiction' employment, and thus came into the heavy artillery category.

By 1916 the long-range German artillery in use on the Western Front was mainly of a makeshift nature, being derived from a policy of placing coastal defence or naval gun barrels on to improvised field carriages. While this was adequate as a stopgap measure, the gunners needed something more suitable and manageable for their long-term equipment, and consequently the German general staff made a special plea to its artillery designers for a world-beater. Both Krupp and Rheinmetall took up the challenge, and as things turned out their individual submissions were virtually identical. Both guns were named **15-cm Kanone 16** or **15-cm K 16**, but in the long term it was the Krupp **15-cm K 16 Kp** submission that was produced in the greater quantities. The Rheinmetall **15-cm K 16 Rh** was produced in some numbers as the demands from the front were so great, but never in the numbers that Krupp was able to churn out.

The 15-cm K 16 was a long and large gun. The overall design was entirely orthodox for the time apart from the fact that the barrel was extraordinarily long (L/42.7 in the Krupp design and L/42.9 in the Rheinmetall offering) for the size of the wheeled carriage. The carriage was a fairly simple box-trail design fitted with a large shield for the gun crew. Heavy spoked wheels were fitted as the gun had to be towed by horse teams as motor traction was by that stage of the war (it was 1917 before appreciable numbers of the guns actually reached the front) at a premium and reserved mainly for the really heavy guns. The weights involved meant that the 15-cm K 16 had to be towed in two loads, the barrel and the carriage. The carriage was usually towed on a special four-wheeled limber which also had some seating for the crew members, who also operated the brakes.

On the Western Front the 15-cm K 16 became one of the most feared of all the German counterbattery guns. The long range (22000 m/24,060 yards) of the gun meant that it could reach well into the rear areas behind the Allied lines to destroy gun batteries, road and rail junctions and generally to lay down harassing fire that could not be countered by anything other than the heaviest and longest-ranged Allied guns (railway artillery or specially emplaced weapons). This entailed a great deal of effort on the part of the Allies, for despite its weight and bulk, the 15-cm K 16 was still more mobile than its potential opposition.



The 15-cm Kanone 16 was manufactured by both Krupp and Rheinmetall, the latter (as seen here) being made in smaller quantities. The equipments were still in limited use during the early campaigns of World War II, as it was one of the few military items permitted to Germany after Versailles.

After 1918 numbers of 15-cm K 16s were handed out to various nations as war reparations (Belgium was a major recipient) but the gun was one of the few allowed to remain on the strength of the small post-Versailles German army. Thus for nearly two decades it acted as a training weapon for a new generation of gunners who, re-equipped and with a new military philosophy, went to war once again. Even then the 15-cm K 16 was used during some of the early World War II campaigns.

Specification

15-cm K 16

Calibre: 149.3 mm (5.88 in)

Length of barrel: 6.41 m (21 ft 0.4 in)

Weight: in action 10870 kg (23,964 lb)

Elevation: −3° to +42°

Traverse: 8°

Muzzle velocity: 757 m (2,484 ft) per second

Maximum range: 22000 m (24,060 yards)

Shell weight: 51.4 kg (113.3 lb)

GERMANY

German 28-cm howitzers

By 1914 the growth of the German navy had ensured a corresponding increase in the number and power of the coastal batteries that were built to defend the various German dockyards and harbours. Coastal defence was the responsibility of the German navy, and as a general rule it adapted naval guns to carry out the coast defence role. But following the general fashion elsewhere it also adopted the high-trajectory howitzer, and for this it had to turn to the army for advice.

By the turn of the century the German navy thus had an adaptation of an army 28-cm (11.02-in) howitzer known as the **28-cm Küstenhaubitze** (coast howitzer). The army weapon was the **28-cm Haubitze L/12**, and both of these heavy weapons were products of the prolific Krupp armament works at Essen in the Ruhr. Both howitzers were intended mainly for the static role: the army howitzer had been designed primarily for fortification-smashing, in which a lengthy emplacement period was of no real importance. Thus the squat barrel of the howitzer rested in a cradle mounted on a large and heavy carriage which was in its turn located on a turntable connected to a heavy firing platform dug into the ground. Both howitzers had features from an earlier age: at the rear was a crane for raising ammunition to the level of the breech, while most of the recoil forces were absorbed by the barrel and cradle sliding along short rails when fired, the rest of the forces being absorbed by the mass and weight of the carriage.

Even by 1914 standards the 28-cm (11.02-in) howitzers were obsolescent. Their weight and bulk rendered them virtually immovable, and the relatively short ranges possible (11400 m/12,465 yards) made them somewhat unecono-

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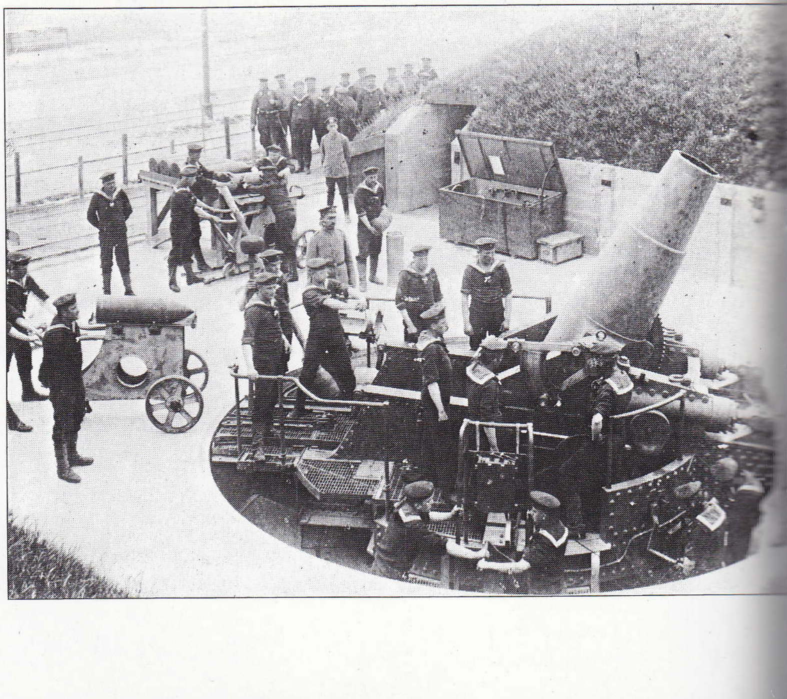


The 28-cm Küstenhaubitze was an extremely unwieldy weapon, its weight and bulk fixing it to one spot and the relatively short range making it uneconomical in terms of manpower and resources. In spite of this, many served throughout the war.

Moving the Big Guns

World War I was fought in the early years of motor transport, often using massively heavy equipment and over the most difficult terrain. While it was appreciated that the new engines could be of the greatest of use, supply was still slow, and the old standby of manpower and horsepower came into play.

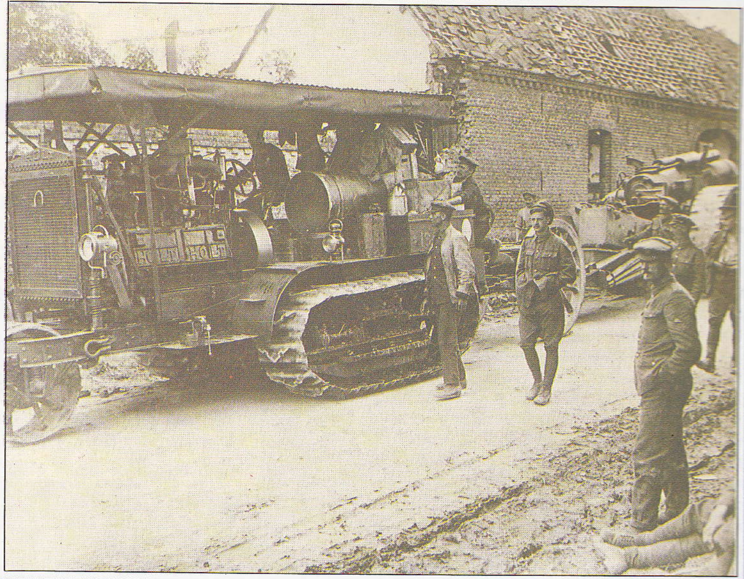
In an age in which mass-produced mechanical transport devices are commonplace, it comes as something of a surprise to realize how scarce such devices were during the early days of this century. Before World War I a great deal of power was generated by the simple application of manual labour assisted at times by the power of the horse, and this has to be remembered in the context of heavy artillery. At that time mechanical traction and powered lifting devices were unusual, so when it came to moving and handling heavy artillery there was often little more than brute force available.

Throughout the centuries gunners have learned to handle even the heaviest of their charges using only what is to hand. This has always involved a complicated system of timbers, joists, pulleys, levers and hard work, and while this can on its own move even the heaviest field gun and its carriage, such methods can have only a limited utility in the movement of large-calibre weapons. Fortunately the monsters in service during World War I had generally been designed at a time when metallurgy and mechanics were beginning to reach an advanced state, so designers were often able to build into these weapons some form of handling system that required only a minimum of physical effort and also offered a greater degree of safety to all concerned. The various systems usually involved built-in rails and winches that enabled a howitzer or gun barrel to be removed or withdrawn on to its transport carriage without the need for special jigs and overhead structures. Some heavy artillery had inbuilt cranes for the same purpose, while some designers simply decided that the best way to assemble and disassemble guns was by supplying a mobile crane that was issued as part of the weapon's standard equipment.

So by the time of World War I the emplacement of a heavy artillery piece was often not quite the problem it might have been, but usually there was still a great deal of work to be done. Pits had to be dug to accommodate the heavy firing platform needed by most weapons of the period, and in some cases earthboxes had to be filled to counteract the forces produced on firing. Heavy subassemblies still had to be manhandled on occasion, and this necessity often led to the allocation of only the largest men to heavy artillery units.

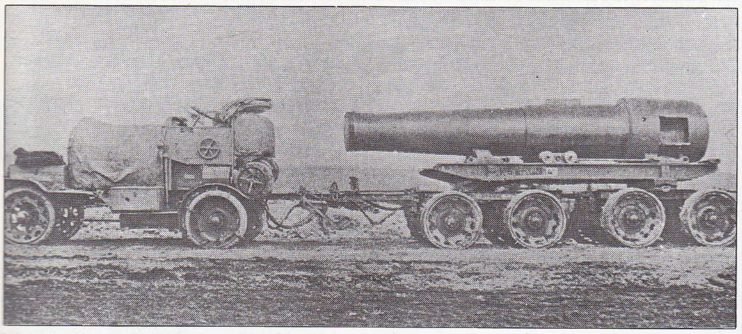
Putting the weapons together or taking them apart was only one aspect of the labour involved in moving heavy artillery. Once the weapon had been broken down into a number of loads, each load had somehow to be pulled to where it was required. Before World War I this usually involved the horse or other draught animal, but the largest weapons required so many teams of horses that any real efficiency was impossible. Some of the less advanced nations had to rely on the horse, but the more advanced nations came to rely upon powered traction in the form of the internal combustion-engined tractor, the steam traction engine and even railways.

Traction engines were very often normal commercial models impressed into military service, and they rarely required any modifications for their new role.

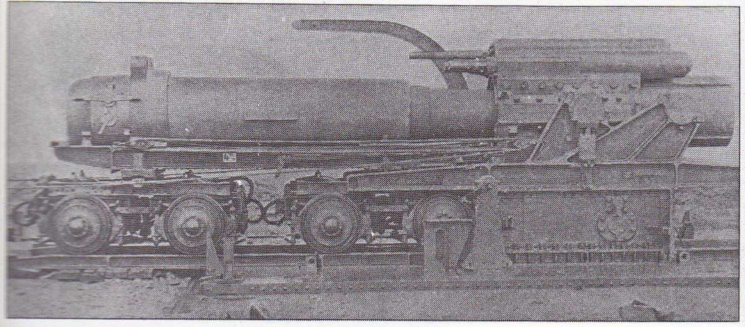

The Holt tractor was very successful in the task of hauling heavy equipment through the mud of the Front. It eventually gave rise to the caterpillar-tracked fighting vehicle, otherwise known as the tank.

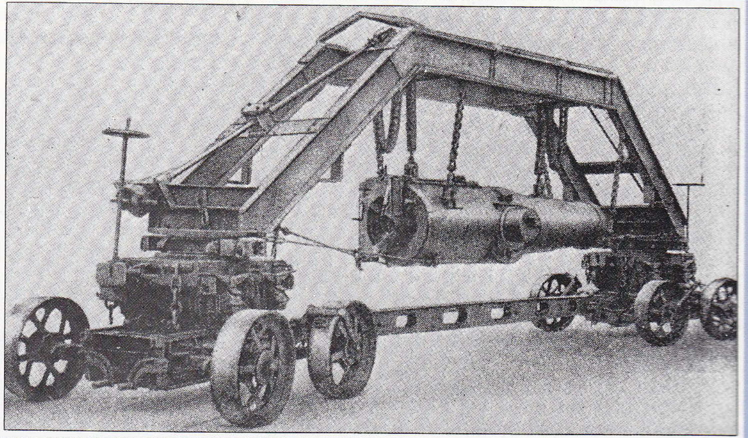
With the motor tractors things were different, however. The motor vehicle was still a relatively simple vehicle, and very often the power generated by the engines was relatively low. The only way to gain the power required to tow heavy artillery was by the enlargement of engines to massive proportions. This in turn led to large and heavy wheels to carry the engines and transmit the power, with the result that the specialist artillery tractors of World War I resembled nothing more than huge bonnets carried on large wheels. In such examples the driver appeared to be a mere appendage to the vehicle. Typical of these monsters were the many designs produced in Austria and Germany, such as the Austro-Daimlers and their ilk.

But it should not be forgotten that all too often the motor tractor and traction engine could not be used for the simple reason that even under war production conditions there were rarely enough to meet all the demands made upon the numbers available. All too often the gunners had to rely on the horse for their traction purposes, and if horses were not available they had to call upon such beasts as draught oxen or even camels. The difficulties involved in using huge teams of such animals to tow heavy and awkward artillery loads across the shattered terrain of World War I battlefields can barely be imagined, but for the gunners who had to carry out such tasks we can now only offer our admiration.


Above: The field version of the 42-cm Skoda could be disassembled for travel, but with a weight of over 100 tonnes, movement was not easy.

Below: The 38-cm model 16 from Skoda was also designed for road transport, to be towed by large wheeled tractors in sections.



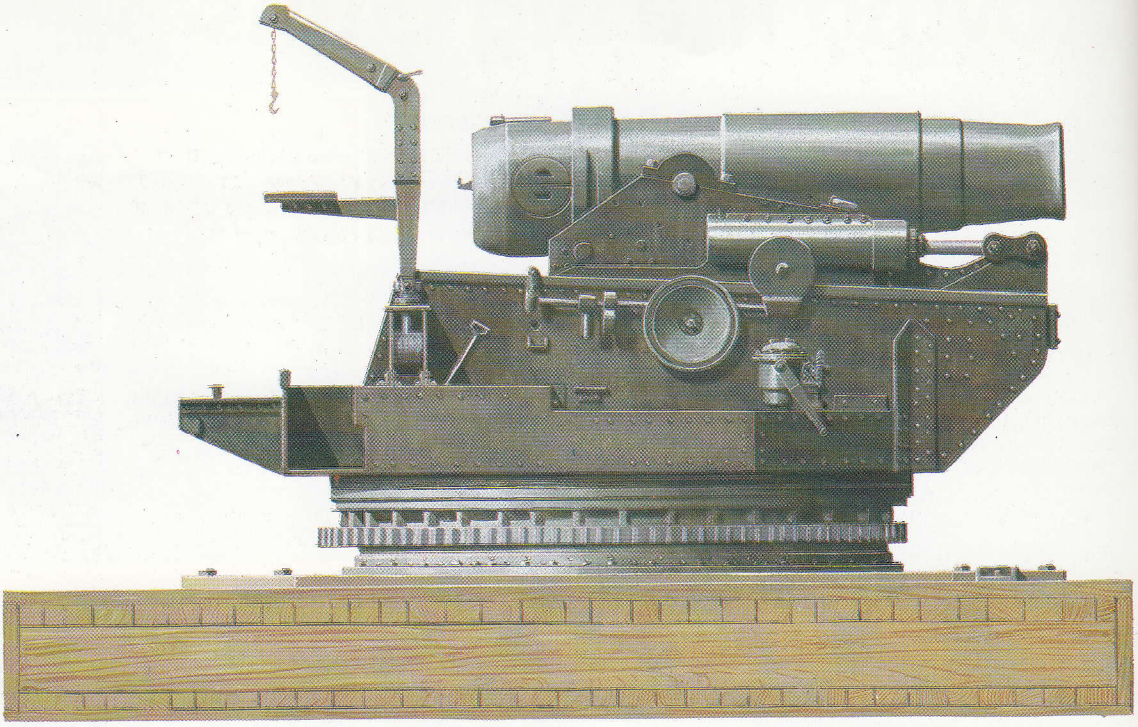

Above: Very often the assembly and disassembly of these heavy pieces required special equipment. Here the barrel of a 370-mm French mortar (howitzer) is suspended prior to fitting onto the firing platform. Often the crane was issued as part of the equipment.

Right: The terrain-crossing ability of the tank was put to good use during the battle of Cambrai. This German 15-cm (5.9-in) gun was captured and towed back across the battlefield.

German 28-cm howitzers (continued)

mic in terms of manpower and travelling requirements. Moreover, each howitzer took three or four days to emplace and as long to remove, and was extraordinarily difficult to move. For transport the howitzers were broken down into the usual loads: the army version travelled in four loads, while the coastal version had to be virtually dismantled and reassembled each time. The most unusual feature of these howitzers was that they used bagged-charge propellants: for many years the German artillery designers had used some form of cartridge case allied to a sliding-block breech mechanism, but the 28-cm (11.02-in) howitzers used bagged charges allied to a screw breech.

During World War I these howitzers were dragged up and down the length of the German lines in France whenever and wherever there appeared worthwhile targets for their power. Both the army and navy versions were used at Verdun and during many of the other major German artillery battles, and most survived the war to be hidden away in various secret stockpiles. Thus both models were to hand when 1939 came around. They were once more pressed into service, this time somewhat modified for traction by half-track vehicles, and they were used during the siege of Sevastopol in 1942 and later during the savage crushing of the Warsaw Rising of 1944. Thereafter they faded from view. It was a wonder that they lasted so long.



Specification
28-cm Küstenhaubitze
Calibre: 283 mm (11.14 in)
Length of barrel: 3.40 m (11 ft 1.9 in)
Weight: in action 63600 kg (140,214 lb)
Elevation: 0° to +65°
Traverse: 360° on turntable
Muzzle velocity: 350-379 m (1,148 to 1,243 ft) per second
Maximum range: 11400 m (12,465 yards)
Shell weight: 350 kg (771.6 kg)

The massive foundation and turntable necessary for the 28-cm (11-in) howitzers made moving them a considerable task, and yet the huge weapons were dragged up and down the Western front throughout the war.

GERMANY

M-Gerät or 'Big Bertha'

The Schlieffen Plan that was intended to secure the German defeat of France, by wheeling armies through Belgium to take the French armies in the flank, was conceived during the 1890s, and honed almost to perfection during the years up to 1914. It entailed the invasion of a neutral state (Belgium) and the rapid destruction of the forts at Liège and Namur, both of them among the most powerful in Europe. Heavy artillery was needed, so Krupp was involved.

Throughout earlier years Krupp had been responsible for a long string of super-heavy guns and howitzers, but to defeat the Belgian forts it had to produce something special. It undertook a series of trials with heavy-calibre weapons that ultimately led to a 420-mm (16.54-in) howitzer known as **Gamma**, a prodigious beast that proved to be very accurate when firing a heavy projectile capable of destroying any fortification. But Gamma was a static weapon, designed to be taken apart for moves and reassembled piece by piece after rail transportation. While the German staff planners appreciated the power of Gamma, they asked for a weapon that could be towed on roads and the obliging Krupp designers looked to their research and came up with the answer. This was an enlarged and modified wheeled carriage originally intended for a 305-mm (12-in) howitzer. Thus was born the **M-Gerät** (*Gerät* means equipment).

All this development took place right at the last possible moment, and it was not until August 1914 that the huge howitzers moved off to war. The type was soon known as the *dicke Bertha* (Fat Bertha, but more commonly translated 'Big Bertha') to its crews and the name stuck. The crews belonged to a special unit known as kurz Marine Kanone 3, and initially only two howitzers went into action against the Belgian forts. They moved on the roads in a series of tractor-towed loads, five to each gun. The carriages had been designed to enable the howitzers to be assembled with a minimum of labour and time. Special armour-piercing projectiles as well as the conventional high explosive types were available.

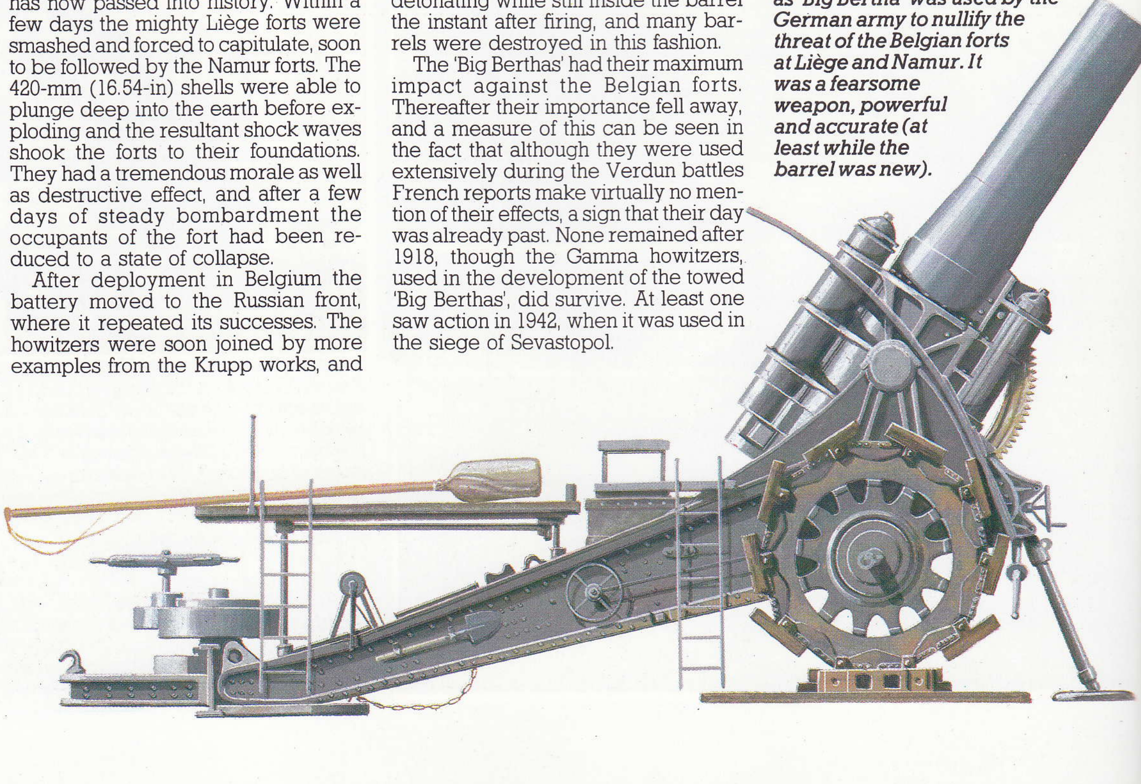
The impact of these huge howitzers has now passed into history. Within a few days the mighty Liège forts were smashed and forced to capitulate, soon to be followed by the Namur forts. The 420-mm (16.54-in) shells were able to plunge deep into the earth before exploding and the resultant shock waves shook the forts to their foundations. They had a tremendous morale as well as destructive effect, and after a few days of steady bombardment the occupants of the fort had been reduced to a state of collapse.

After deployment in Belgium the battery moved to the Russian front, where it repeated its successes. The howitzers were soon joined by more examples from the Krupp works, and yet more were used on the Western Front. However, it was soon learned that the type's accuracy fell off as the barrel became worn after even a limited period of firing and that, consequently, destructive impact was reduced. Although the 'Big Berthas' had a maximum range of 9300 m (10,170 yards), their best accuracy was obtained at around 8680 m (9,490 yards). Another problem came painfully to light when it was discovered that the projectiles were very prone to detonating while still inside the barrel the instant after firing, and many barrels were destroyed in this fashion.

The 'Big Berthas' had their maximum impact against the Belgian forts. Thereafter their importance fell away, and a measure of this can be seen in the fact that although they were used extensively during the Verdun battles French reports make virtually no mention of their effects, a sign that their day was already past. None remained after 1918, though the Gamma howitzers, used in the development of the towed 'Big Berthas', did survive. At least one saw action in 1942, when it was used in the siege of Sevastopol.

Specification
M-Gerät
Calibre: 420 mm (16.54 in)
Length of barrel: 6.72 m (22 ft 0.7 in)
Weight: in action 42600 kg (93,915 lb)
Elevation: 0° to +65°
Traverse: 20°
Muzzle velocity: about 426 m (1,400 ft) per second
Maximum range: 9300 m (10,170 yards)
Shell weight: 810 kg (1,786 lb)

The mighty 420-mm howitzer known as 'Big Bertha' was used by the German army to nullify the threat of the Belgian forts at Liège and Namur. It was a fearsome weapon, powerful and accurate (at least while the barrel was new).



The Paris Gun

March 1918 saw the final major German offensive of the war, with an all-out assault which caught the Allies by surprise. One of the aims of the German general staff was to create as much confusion behind the lines as possible; to this end, a Krupp project was put into effect, and one of the most unusual weapons of the war entered service.

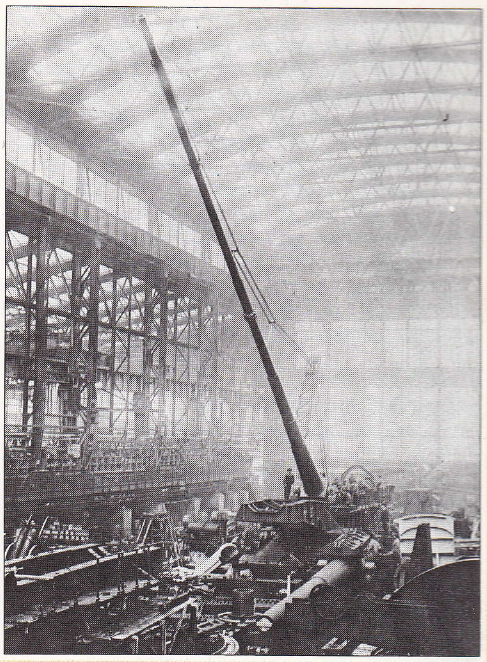
At 07.30 on 23 March 1918 there occurred in the Quai de Seine (in the north east of Paris) an explosion for which no cause could be found. About 20 minutes later there was a similar explosion in the crowded Boulevard de Strasbourg and this time, when the crowds cleared, it was found that eight unfortunates had been killed and a further 13 injured. Again the cause of the explosion was not apparent but some steel fragments were found, suggesting an aerial bomb. But no aircraft had been seen, nor were any noticed when a third explosion occurred in the Rue de Château-Landon, where a building was partially demolished. By this time the Paris officials were deeply anxious to discover the actual cause of the explosions, and investigators began to piece together such evidence as there was. Almost as soon as they began there was a fourth explosion, this time in the Rue Charles-Cinq, and yet another person was killed.

It was not long before more fragments were found and this time there were enough to indicate that they came from artillery shells. But where was the gun that had fired them? More mystery shells landed as the investigators worked and a general alarm was sounded, sending the people of Paris to their shelters. By the eighth explosion the investigators had already decided that the shells were from a 208-mm (8.19-in) gun and even hinted at a possible location for the gun involved. Their prediction was that the gun was somewhere in the Crépy region, but Crépy was 120 km (75 miles) from Paris!

The Germans obviously had some sort of long-range gun of a kind hitherto only imagined. It was all too much for the citizens; as more and more of these mystery shells fell in and around Paris the population simply left the city. Over the next few days shells contined to land in a sporadic pattern, causing limited damage and some casualties, but much worse was to come. On Good Friday, 29 March, a shell fell into the church of St Gervais on the Ile de France right in the centre of the city: 82 people were killed and 68 more injured. The mystery gun had caused its biggest casualty toll to date. But what was the gun that had caused all this carnage?

The answer was complicated, and began with German ballistic trials in which the projectiles travelled much further than anticipated. The cause was found in the fact that the projectiles had left the thicker strata of the Earth's atmosphere; as air friction was greatly reduced for much of the trajectory, range was enhanced. To take advantage of this effect a special gun was designed. A 380-mm (14.96-in) naval gun barrel was relined with a new and much longer 210-mm (8.27-in) barrel (about 40 m/131.2 ft overall), for which special charges and projectiles were developed. The new gun was an oddity with its very long barrel that protruded some way out of the original naval gun. It weighed no less than 142 tonnes, but it had a range of 132 km (82 miles) and it could be made to work consistently, if only at a price. Each time the gun was fired the shell passing along the barrel produced so much wear that the internal calibre actually increased, and successive shells had to be of larger diameter than the one before. The long barrel tended to droop under its own weight so external bracing had to be provided.

As always, a Krupp designer was the man behind all this advanced ballistic technology, the same man in fact who was responsible for the 420-mm (16.54-in) 'Big Berthas'. The whole project absorbed a great deal of Krupp's facilities but there was a reason behind it all. In early 1918 the German general staff intended to make a series of attacks along the Somme that were intended to win the war and the new long-range gun was to play its part in harassing the Paris area and generally causing confusion and disruption. This is the reason for the popular name 'Paris Gun' for what was officially designated the lange 21-cm Kanone in Schiessgerüst (long 21-cm gun in firing platform). Later versions of the gun used a basic calibre of 232 mm (9.13 in) when the original barrel was



Towering over the other products of the Krupp works, the Paris gun nears completion. The gun was such a challenge to the technology of the time that a fair proportion of even such a large firm's resources was taken up by the project.

The barrel of the Paris gun is test-fired. Such were the stresses of firing upon the metal of the barrel that each discharge appreciably increased the bore of the weapon.

bored out, but it must be stressed that each shell that was fired enlarged the barrel calibre, so carefully manufactured shells had to be fired in the correct sequence.

The firing platform for the Paris Gun was of naval origin, with a turntable under the forward end and racers running on tracks at the other. The gun and its carriage were carefully emplaced near Crépy on a solid timber base and the surrounding area was carefully concealed in the centre of a wood. So careful was the concealment that the German gunners even went to the trouble of planting extra trees and replacing them if they wilted.

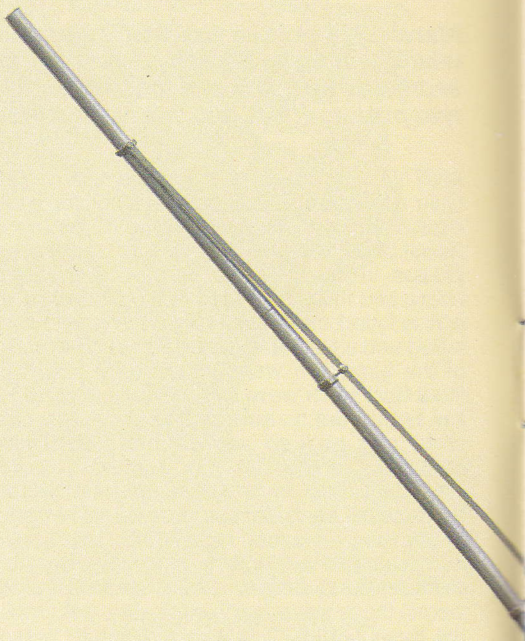
French reaction

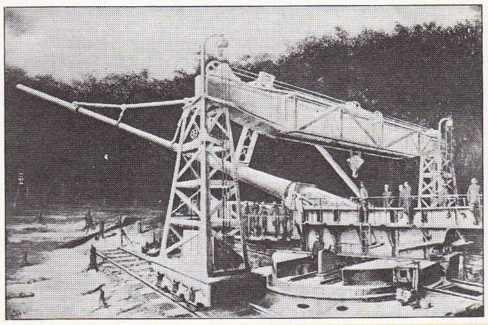
But as the drizzle of shells continued to fall on Paris the French reacted. They moved heavy railway guns into the area closest to Crépy and began to fire into the area where they suspected the gun might be located. This came at a time when the degree of barrel wear in the German gun was so great that its accuracy was becoming extremely erratic and range was falling away. The barrel life was learned to be of the order of only 60 rounds, and a new barrel was fitted to the gun while it was still in its location in the Crépy woods.

Away to the north of the gun the advancing German armies were pushing forward with great success. They had virtually eliminated one British army, and by 30 March had advanced as far as Montdidier. It had already been decided that the Paris gun should then be moved to the Bois de Corbie, which is even closer to the French capital than Crépy. The gun then launched a second bombardment of Paris that was far more accurate than the first as the gunners were not firing at the extreme limits of its range. More and more barrels were changed, but once again the Paris gun attracted the attention of French army railway guns and airborne spotters to the extent that life on the new site became very unhealthy. Casualties were inflicted on the gun crew by near-misses and even by one shell exploding in the gun: the shell had apparently been loaded in the wrong sequence and did not fit the barrel correctly.

By this time the Parisians, or rather those who were left, had begun to get used to the idea of being constantly shelled. Paris was a big place and shells could not fall everywhere so a form of normal life was resumed. On occasion one would land in a vulnerable spot, such as a Metro station, but on many more occasions they fell on open roads or empty buildings, causing few casualties. The German advance on the Marne by the end of May caused much more concern.

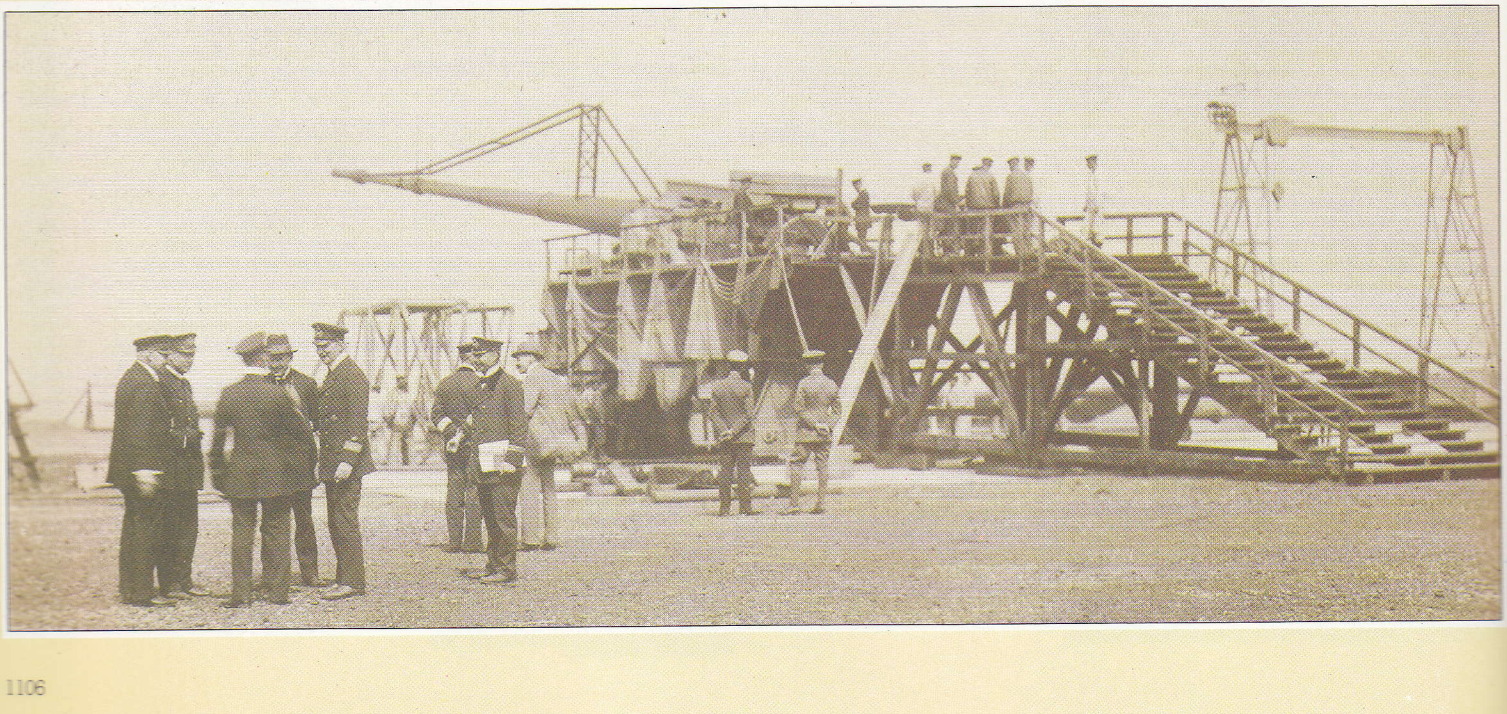
The Paris gun was eventually moved to a new position at Beaumont in order to escape the attentions of French railway guns, and from there the third bombardment was started. This was a very carefully prepared position with a steel bed for the carriage turntable and rail access for the ammunition on a lavish scale (the earlier gun positions had possessed rail access, but not on the scale of the Beaumont site). By this time the 232-mm (9.13-in) barrel was in use and was shooting very well, but already the gun was having less and less effect. The mighty land battle that was taking place to the north had reached the stage where the main German thrust had been contained, so the chances of the Germans having any major success before the American armies arrived in force had passed. The Paris gun could do little to remedy this state of affairs, and could merely keep up the harassing fire to create as much nuisance as possible. The ebb and flow of the battle led to a new gun location at a site in the Bois de Bruyères, and by 5 July it had resumed its bombardment of Paris. But it was all to no avail. By August the Allies were once more on the move. The German attacks had finally come to an end and in the process the German army had exhausted its last reserves of men and energy. All along the line they fell back towards Germany, abandoning all the gains they had made in the early months of the year. As they retreated they moved well out of range of Paris and the guns were dismantled and withdrawn. By that stage there was more than one gun (perhaps as many as three) though only one was used in action at any one time.





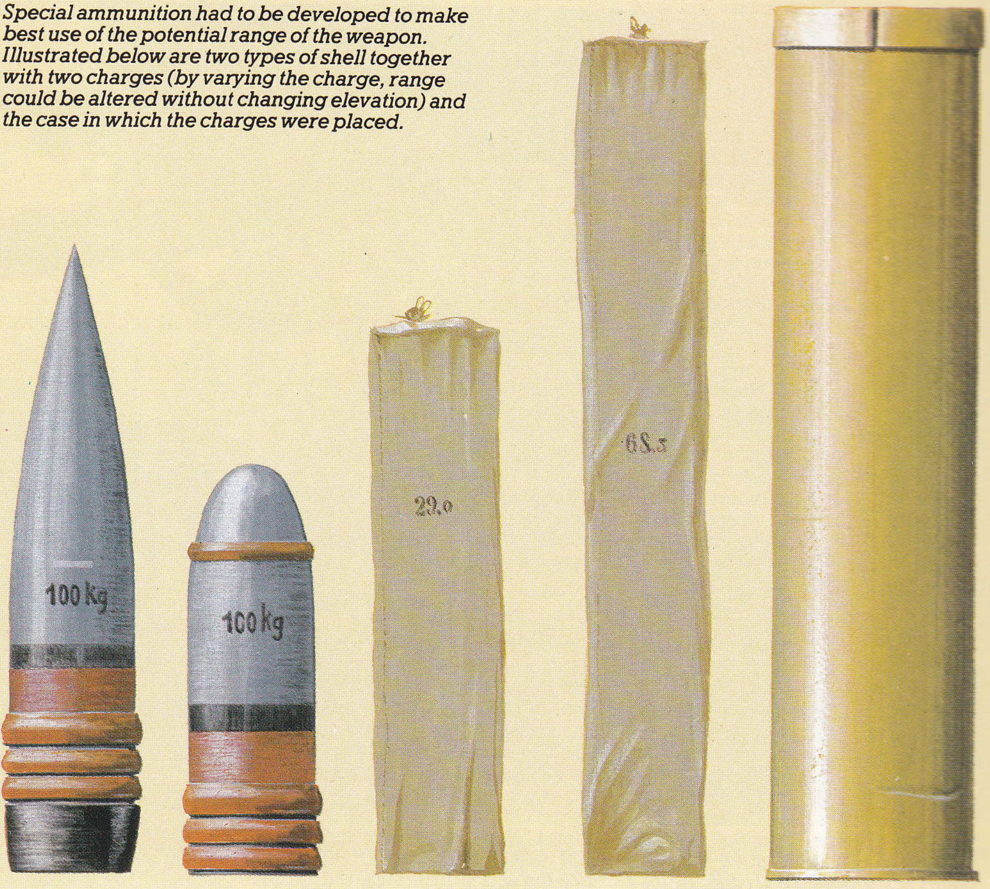
An impression of the Paris gun (officially known as the 'lange 21-cm Kanone in Schiessgerüst'), on location in the forest of Crépy.

On the proofing range the Paris gun is prepared for firing. The external support was necessary to ensure accuracy in the long and slender barrel. The unprecedented range was purchased at the expense of weight of shell.

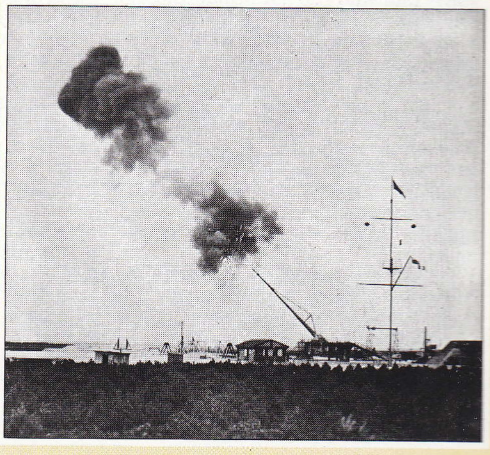


Exactly what happened to the Paris guns in the aftermath of the war is still a mystery. None ever fell into Allied hands, although some firing platforms were found and carefully recorded for history. It seems safe to say that they were cut up to prevent the Allies from learning their secrets, but a great deal of ballistic data was accrued and carefully hidden away ready for a later generation of German artillery designers. At least one German World War II weapon, the 21-cm Kanone (Eisenbahn), owed more than passing influence to the Paris gun, and perhaps others did as well.

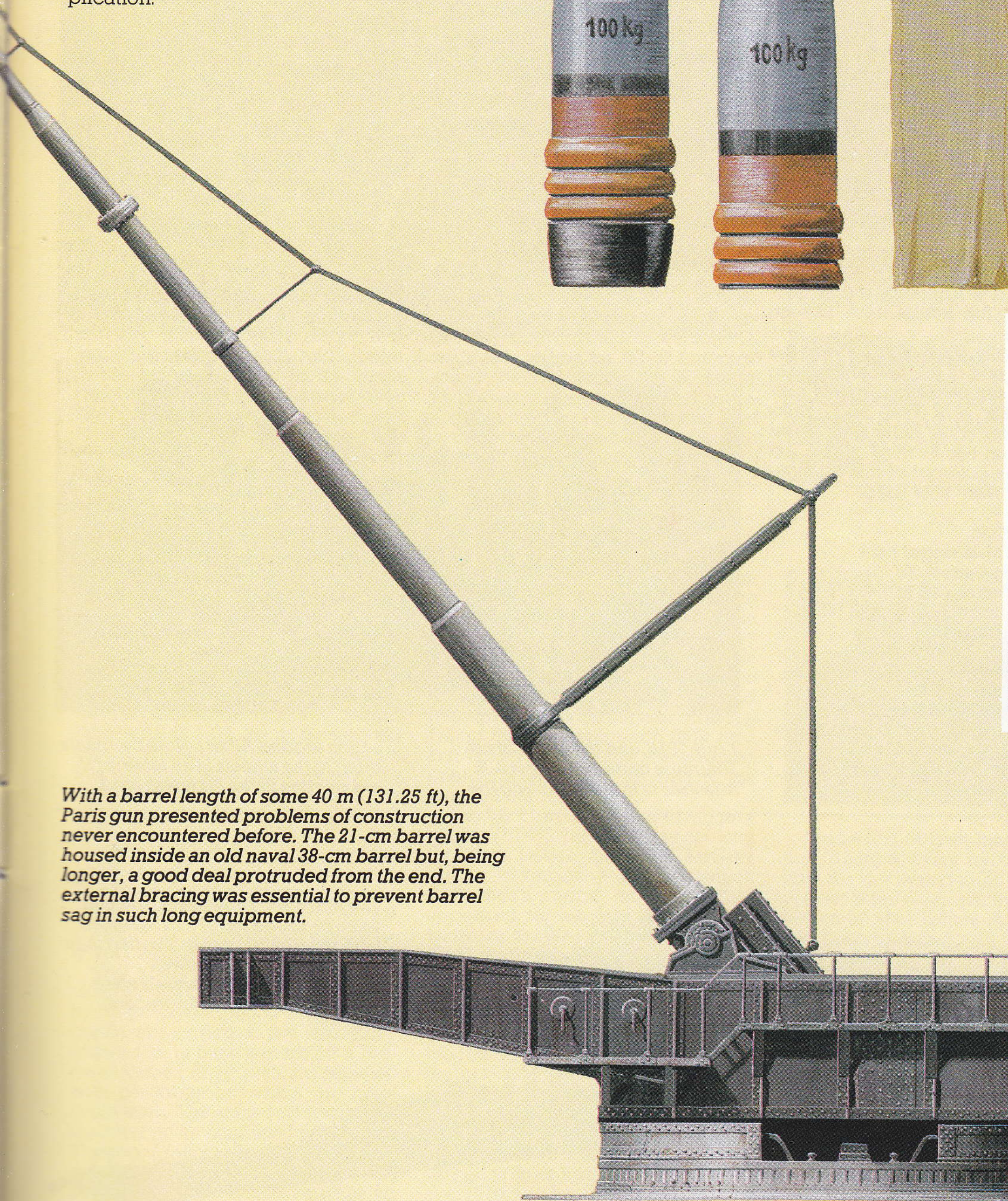
But for all its brilliant technical success, the Paris gun was a failure. It was intended to make Paris a dead city and render it useless to the Allies as a centre of industry and communications, but apart from a brief initial period of panic this never happened. Paris was too large a city for even a constant drizzle of shells to have anything more than local effect, and once the Allied advance had placed the city out of range the Paris gun could have no other application.



Special ammunition had to be developed to make best use of the potential range of the weapon. Illustrated below are two types of shell together with two charges (by varying the charge, range could be altered without changing elevation) and the case in which the charges were placed.



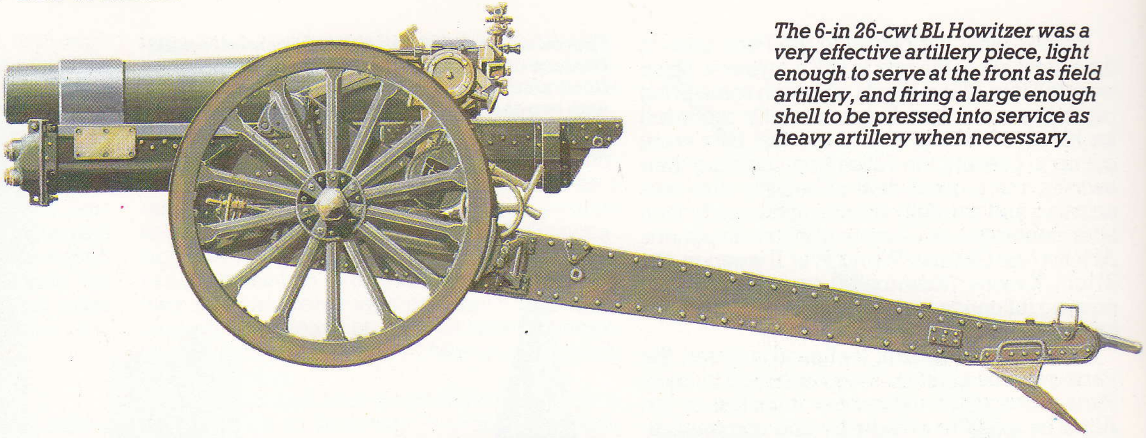
Above: The fully assembled Paris gun fires at 45° elevation. Each firing widened the bore of the barrel, and during the barrel life of some 60 rounds, a series of shells of successively increasing calibre had to be used.



With a barrel length of some 40 m (131.25 ft), the Paris gun presented problems of construction never encountered before. The 21-cm barrel was housed inside an old naval 38-cm barrel but, being longer, a good deal protruded from the end. The external bracing was essential to prevent barrel sag in such long equipment.

UK

6-in 26 cwt BL Howitzer



The 6-in 26-cwt BL Howitzer was a very effective artillery piece, light enough to serve at the front as field artillery, and firing a large enough shell to be pressed into service as heavy artillery when necessary.

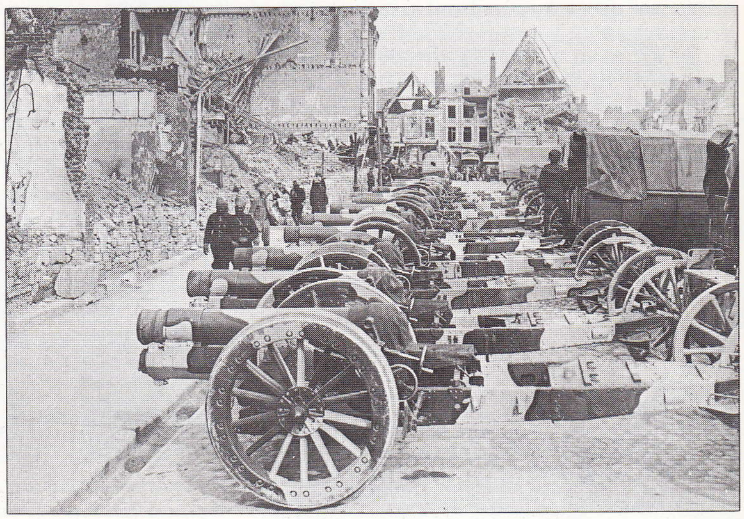
The **6-in 26 cwt BL Howitzer** is one of those weapons that just scrapes into the category of heavy artillery, although its 6-in (152.4-mm) calibre would seem to categorize it more as an ordinary field artillery piece. However, the type was frequently used as heavy artillery by the British during World War I for the simple reason that on many occasions there was nothing else to hand. Thus the 6-in 26 cwt had to fill a gap, though it must be admitted that it filled that gap very well.

When the British army went to war in 1914 its Royal Artillery siege batteries were equipped with an elderly piece known as the **6-in 30 cwt BL Siege Howitzer**. This was very much a relic of earlier times, had a very limited range and lacked such refinements as an effective recoil mechanism. It was also too heavy for the conditions encountered in France, so a new piece was demanded. This was produced in a remarkably short time, design beginning in early 1915 and the first examples being ready soon after the middle of the same year. By the end of 1915 nearly 700 were in the hands of the troops.

The new howitzer was named the 6-in 26 cwt BL Howitzer to differentiate it from its predecessor. It proved to be a remarkably efficient weapon, and its employment was confined almost completely to the front lines for the demolition of enemy earth works, trenches and bunkers. It had a short stubby barrel that could be elevated to provide the plunging fire that was required in such tasks, such elevation being made possible by the use of a heavy box trail. The recoil mechanism was particularly effective, so effective in fact that it was used many years afterwards as the mechanism for the World War II 5.5-in (139.7-mm) gun-howitzer, a piece still in use in many places. A further measure of the success of the design can be seen in the fact that once in service the weapon remained virtually unchanged apart from some minor modifications, no designation higher than Mk I being required.

By 1916 the 6-in 26 cwt was one of the most important and numerous heavy guns in the British inventory, and its use spread to many other Allied and Commonwealth armies. Two types of projectile were fired, one weighing 45.36 kg (100 lb) and the other weighing 39 kg (86 lb). The maximum range with the lighter shell was 10425 m (11,400 yards). Millions of rounds were fired from these howitzers but many were in active use when the war ended, and were retained in service until World War II. Some saw action during the early North African battles. Exports were made to Belgium, Italy and the Netherlands, where the weapon was designated **Obusier de 6″**, **Obice da 152/13** and **Houwitzer 6″** respectively. Weapons taken over by the Germans from these sources in World War II were thus the **15.2-cm sFH 410(b)**, **15.2-cm sFH 412(i)** and **15.2-cm sFH 407(h)**, while pieces captured from the British were **15.2-cm sFH 412(e)**.

Incidentally, the 6-in 26 cwt was the subject of one of the first attempts to produce a self-propelled artillery platform. In late 1916 some Mk I tanks were converted to carry 6-in 26 cwt howitzers on two forward 'horns', but despite the potential of this arrangement they were little used.



Right: 6-in 26-cwt howitzers of the V Brigade, Royal Garrison Artillery parked in the Grande Place, Peronne, on 17 March 1918. By this time, motor transport was a relatively common feature of the British Army.

Specification

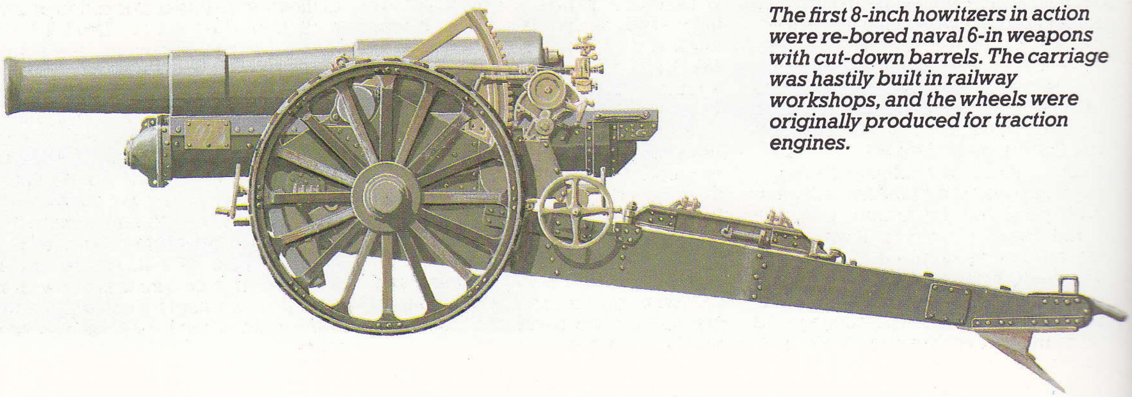
6-in 26 cwt BL Howitzer Mk I
Calibre: 152.4 mm (6 in)
Length of barrel: 2.22 m (7 ft 3.55 in)
Weight: in action 3693.5 kg (8,142 lb)
Elevation: 0° to +45°
Traverse: 8°
Muzzle velocity: 429 m (1,407 ft) per second
Maximum range: with light shell 10425 m (11,400 yards) and with heavy shell 8685 m (9,500 yards)
Shell weight: 39 or 45.36 kg (86 or 100 lb)

THE VIMY QUEEN

1 July 1916, and the battle of the Somme is under way. This 6-in howitzer is in action during the action around Albert. Note the cleats fitted to the wheels in an attempt to aid traction in the Flanders mud.

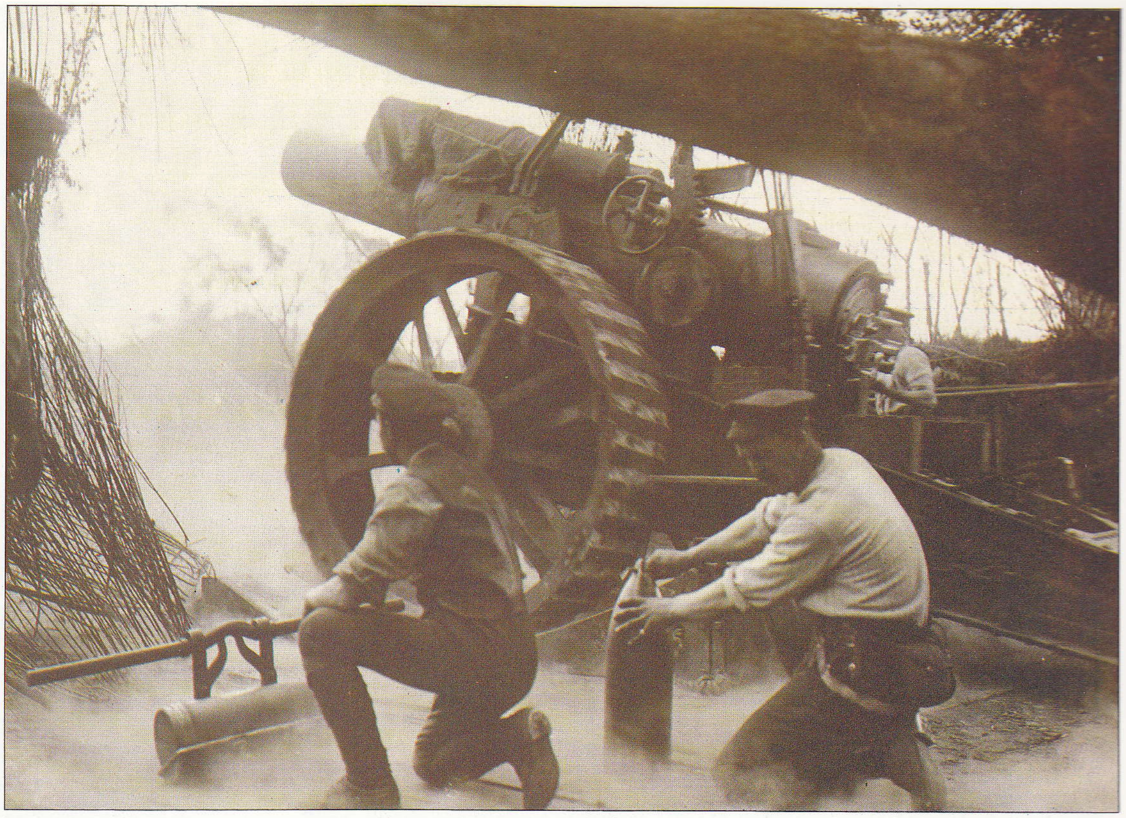
UK

8-in BL Howitzer



The first 8-inch howitzers in action were re-bored naval 6-in weapons with cut-down barrels. The carriage was hastily built in railway workshops, and the wheels were originally produced for traction engines.

When the BEF went to France in 1914 it was, like most combatants, ill-equipped with heavy artillery. It did not take long for the British to realize that they would need heavy artillery in great quantities and in a very short time, but there were few sources for such weapons. Unlike their German and French counterparts, the military planners were unwilling to strip the coastal defences, and there were few forts from which to remove the armament, so an alternative had to be produced quickly. The answer was the 152.4-mm (6-in) naval gun, already in production for both Royal Navy and



By May 1918, when this example was in action at Wagonlieu, the 8-in BL howitzer had evolved through several marks, and had become an excellent weapon.

coast-defence purposes, but a 152.4-mm (6-in) projectile was not thought heavy enough.

The answer was to obtain a quantity of barrels from old 152.4-mm (6-in) guns from stockpiles all over the country. These barrels were generally well worn, but this did not matter for they were considerably shortened by cutting off a length from the muzzle and boring out the barrel and chamber to a new calibre of 203 mm (8 in). The resultant barrel was then mounted on a hastily devised carriage produced at numerous railway workshops throughout the UK, and to complete the makeshift nature of these guns they were mounted on traction engine wheels for ease of movement.

The **8-in BL Howitzer** was a ponderous load and a bulky weapon, but it was at least something to issue to the troops in France. Initially 100 were ordered, but these were soon followed by more, the first entering service in February 1915. These initial howitzers ran to no fewer than five marks with as many marks of carriage, all of them differing in some way or another from the rest. These were soon followed by an **8-in BL Howitzer Mk VI**, which was a purpose-built weapon with a longer barrel than the earlier five marks for improved range. In its turn this was replaced in late 1916 by the **8-in BL Howitzer Mk VII**, which had an even longer barrel. A later **8-in BL Howitzer Mk VIII** differed only in details.

The Mk VII and VIII howitzers were excellent weapons that formed the basis for a family of 203-mm (8-in) guns that are in service to this day. The later marks had a much more sophisticated carriage than the early marks, and were thus easier to handle and to move to the extent that they can be considered as different guns. Some of these late howitzer marks were handed over to the US Army when it arrived in France in 1918, and it is via them that the modern 203-mm (8-in) guns have been derived.

After 1918 the early Mks I-V were withdrawn (if they had not been retired already) but the Mks VII and VIII were retained by the British army and some others (including the US Army). In 1939 they were still on hand for the early campaigns of the war and later many were converted to a new calibre of 183 mm (7.2 in). Examples captured in France by the Germans during 1940 were redesignated **20.3-cm sFH 501(e)** but saw little use.

Specification

8-in BL Howitzer Mk VII

Calibre: 203 mm (8 in)
Length of barrel: 3.77 m (12 ft 4.3 in)
Weight: in action 9017 kg (19,880 lb)
Elevation: 0° to +45°
Traverse: 8°
Muzzle velocity: 457 m (1,500 ft) per second
Maximum range: 11245 m (12,300 yards)
Shell weight: 90.7 kg (200 lb)

UK

9.2-in BL Siege Howitzers

In 1914 the British army was not entirely devoid of heavy artillery, for the Royal Artillery had in service a heavy weapon known as the **9.2-in BL Siege Howitzer Mk I**. This had its origins in a staff requirement dated 1910, but it was not until 1913 that the first examples were produced. The type was cleared for service in 1914. As its designation implies, the 233.7-mm (9.2-in) howitzer was intended as a siege weapon for the demolition of fortifications, and was accordingly constructed as a purely static weapon mounted on a large and heavy firing platform. On the road the howitzer was carried in three loads. Emplaced, the Mk I appeared to be a rather complex weapon, but closer examination soon showed that it was really very simple.

The short howitzer barrel was mounted in a cradle that contained the hydro-pneumatic recoil system. This cradle was carried on two large sideframes that in their turn sat on a segment-shaped firing platform supplied with platforms on which the crew could work. The entire unit was in turn mounted on an emplaced firing base. The recoil mechanism was of fairly limited efficiency, and thus there was provision in front of the carriage for what must have been the 9.2's most unpopular feature. This was a large steel box, open at the top to allow it to be filled with earth. The weight of the filled box provided more stability when the weapon was fired at low angles of elevation, for without it the entire howitzer and carriage could rear upwards and to the rear on firing. Filling this box with earth took time and labour, and before the howitzer could be moved it all had to be emptied out again.

The Mk I had only a limited range of 9200 m (10,060 yards). It was not long therefore before the Royal Artillery started to request a similar weapon with more range, and this duly appeared during late 1916. It was known as the **9.2-in BL Siege Howitzer Mk II**, and differed mainly in that it had a longer barrel providing a range of 12740 m (13,935 yards), but for the gunners the main importance was that the recoil system was enlarged to absorb the recoil forces to such an extent that the unloved heavy earth box was no longer necessary. Otherwise the Mk II followed the same general lines as the Mk I in both general appearance and construction. As before, the Mk II was carried in three loads, but there was an overall increase in weight of each load by about 1 tonne.

The major heavy artillery piece in British service in 1914 was the 9.2-in Siege Howitzer. As its name suggests, it was designed to be used from a fixed position, and movement involved breaking the equipment down into three sections.

Production of both marks of 233.7-mm (9.2-in) howitzer ran to 812 by the time the war ended in 1918, and many of these were either stockpiled or passed on to other nations. The US Army had been provided with some equipments when it arrived in France during 1918, but others went to Commonwealth armies and after 1918 others ended up in such nations as Belgium, the newly-formed Baltic States and even the Soviet Union (via the White Russian forces). In 1939 the weapon was still in Royal Artillery service, but many were lost during the events of May and June 1940, which was just as well as ammunition for these howitzers was in increasingly short supply and there were no facilities to manufacture more.

Specification

9.2-in BL Siege Howitzer Mk II

Calibre: 233.7 mm (9.2 in)
Length of barrel: 4.33 m (14 ft 2.51 in)
Weight: in action 16460 kg (36,288 lb)
Elevation: +15° to +50°
Traverse: 60°
Muzzle velocity: 488 m (1,600 ft) per second
Maximum range: 12470 m (13,935 yards)
Shell weight: 131.5 kg (290 lb)

UK

12-in BL Siege Howitzers

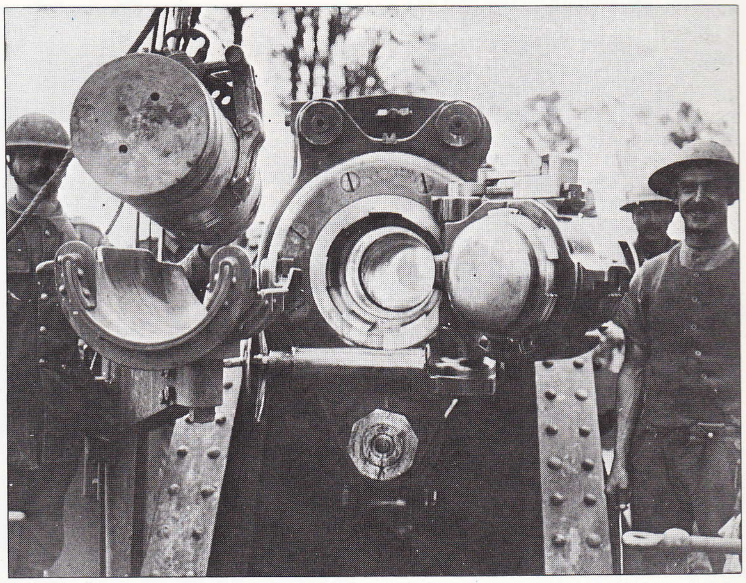
By 1915 World War I was well under way, and the pattern of the battles that were to rage for the next three years had already been set. Also established was the need for yet more and heavier artillery, and the Elswick Ordnance Company was requested to produce a heavy weapon for delivery into the line as soon as possible. Elswick simply took the existing 233.7-mm (9.2-in) howitzer design and scaled it up to a new 305-mm (12-in) calibre. In general the new howitzer resembled the earlier weapon, but the recoil mechanism was much revised and by early 1916 the first examples were ready.

The **12-in BL Siege Howitzer Mk I** was intended for a railway mounting, but a version for road use was also required. Here Vickers became involved, and it too took the 233.7-mm (9.2-in) weapon as a starting base and enlarged it accordingly. This resulted in the **12-in BL Siege Howitzer Mk II**, which in appearance closely resembled the 233.7-mm (9.2-in) equivalent right down to the retention of the massive earth box. On the 305-mm (12-in) version this required no less than 20 tons of earth to prevent the recoil overcoming the stability of the carriage at low angles of elevation. Being larger than the 233.7-mm (9.2-in) weapon, the 305-mm howitzer had to be transported in six loads (barrel, cradle, bedplate, carriage, earthbox and accessories). Assembly was carefully thought out and accomplished by a system of girder ramps, winches and jacks, but it was a lengthy process and all for a maximum range of only 10370 m (11,340 yards).

The 12-in **BL Siege Howitzer Mk III** was another railway mounting, so it was not until the appearance of the **12-in BL Siege Howitzer Mk IV** in 1917 that the field gunners got their required range increase, which had been requested almost as soon as the Mk I reached the batteries. The Mk IV was a lengthened Mk II which provided a range of 13120 m (14,350 yards), but other changes were incorporated at the same time. A new Asbury breech mechanism was introduced and the carriage was beefed up all round, but to the dismay of the gunner the earthbox in front of the carriage was carried over, so the spade work had to continue. A power rammer was provided, which no doubt took away a considerable workload from the gun crews, and extra ammunition handling jibs were provided at the rear. The overall effect of all these additions was to provide an increase in the rate of fire.

On the move the Mk IV was originally towed by steam traction engines in six loads, as had been the case with the Mk II. After 1918 heavy trucks were introduced for towing, and this arrangement was still in service in 1939 when the BEF took some Mk IVs over to France. There the weapons took up so much room on the road system that they were known as '12-in Road Hogs'. They did not last long, for when the Germans invaded France in 1940 their tactical initiative rendered the 305-mm (12-in) howitzer's lack of mobility a major disadvantage. Events simply swept around them, and all were either destroyed or captured, leaving a tiny handful in the UK for training purposes only.

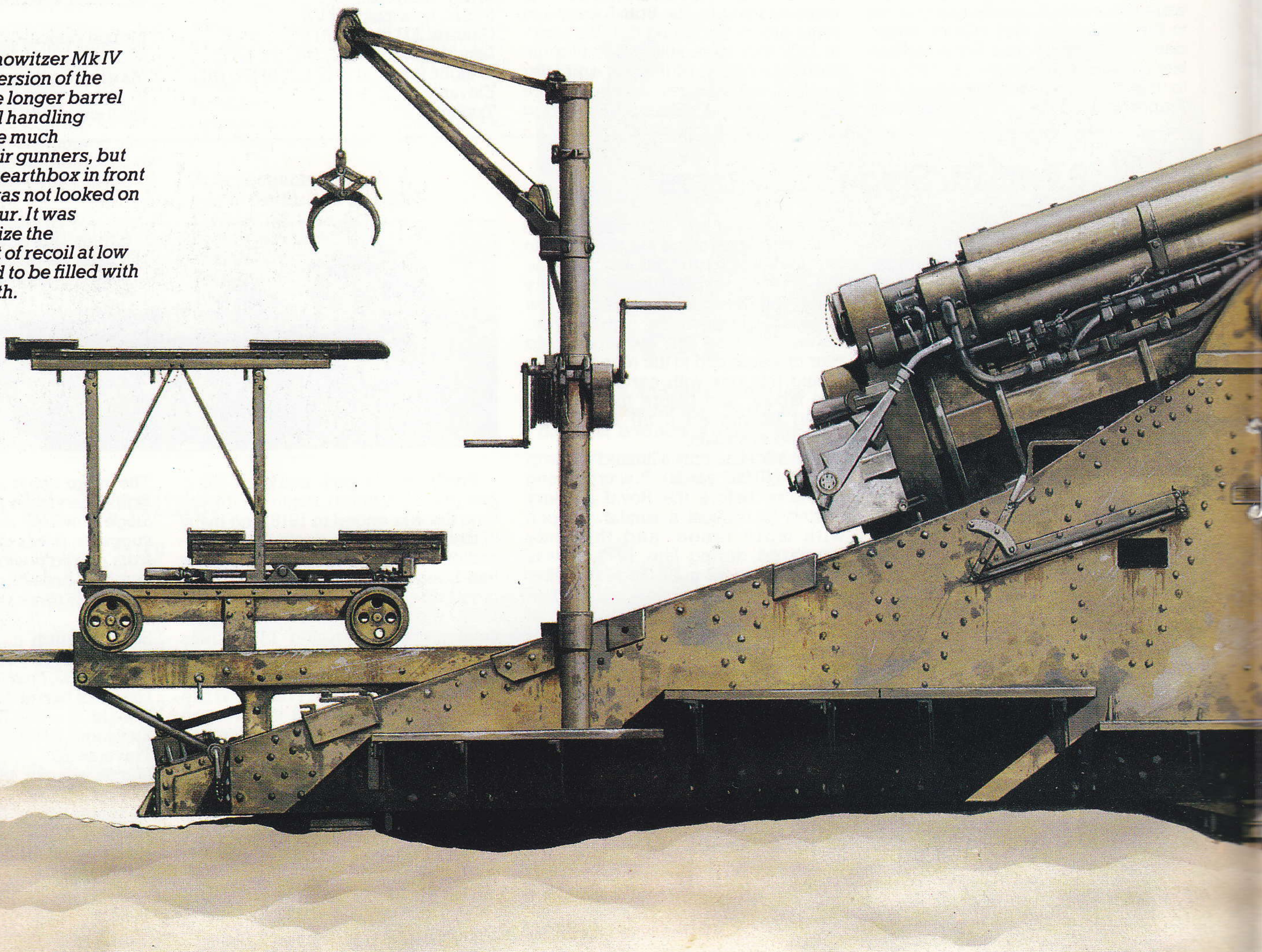
The 12-in **BL Siege Howitzer Mk V** was another railway mounting.



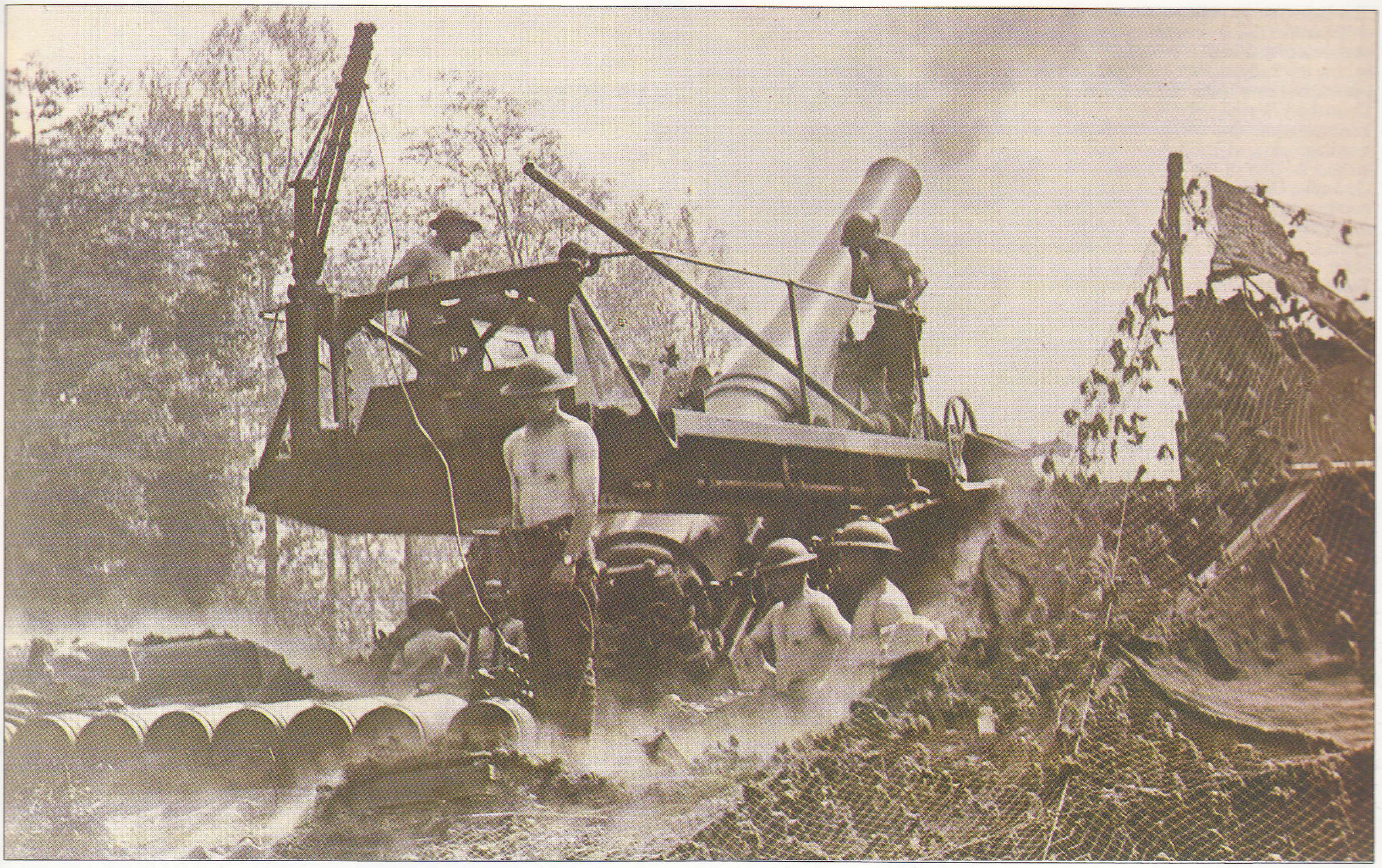
The breech of a 12-in howitzer, showing the cradle for the massive shell together with some of the shell-handling equipment. Later models employed a mechanical ramming device to insert the shell into the barrel.

Specification

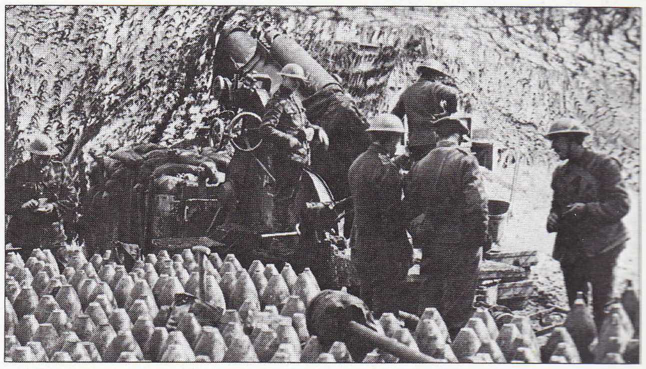
12-in BL Siege Howitzer Mk IV
Calibre: 305 mm (12 in)
Length of barrel: 5.65 m (18 ft 6.5 in)
Weight: in action 57915 kg (127,680 lb) with earthbox loaded
Elevation: +20° to +65°
Traverse: 60°
Muzzle velocity: 447 ft (1,468 ft) per second
Maximum range: 13120 m (14,350 yards)
Shell weight: 340 kg (750 lb)



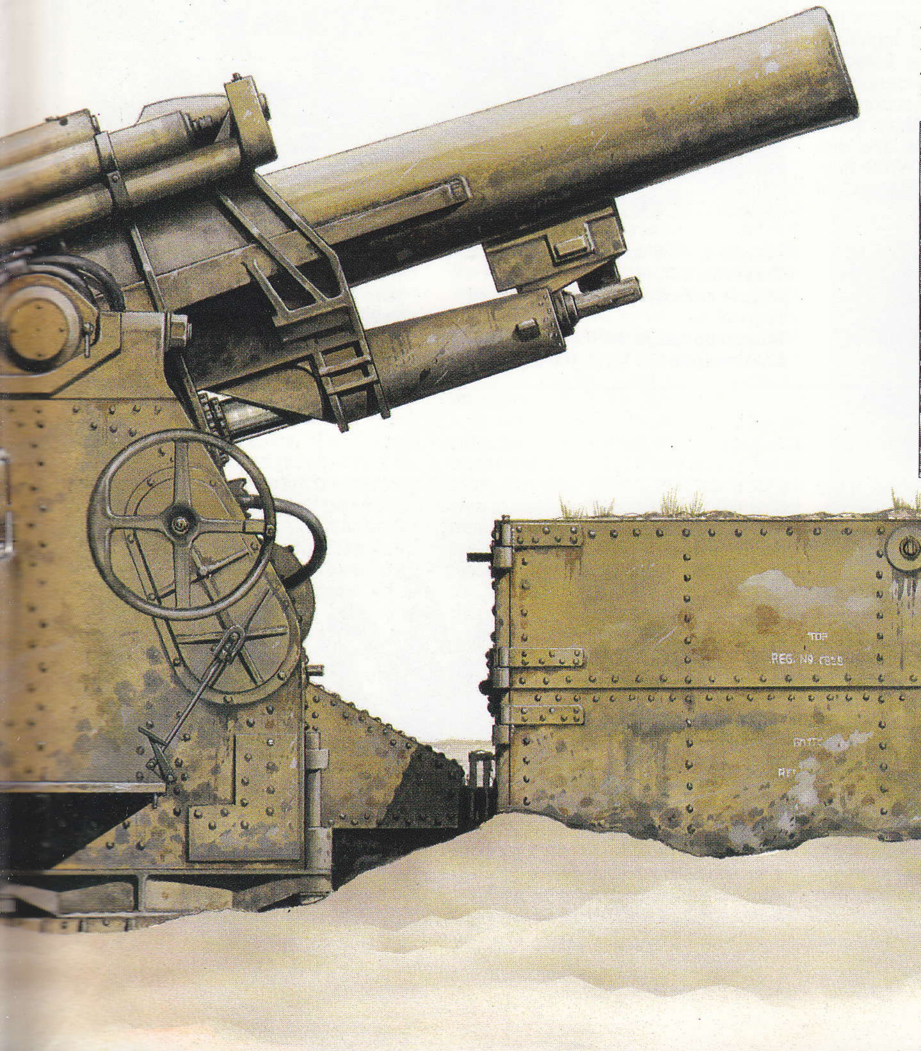
The 12-in BL siege howitzer Mk IV was an improved version of the original model. The longer barrel and improved shell handling arrangements were much appreciated by their gunners, but the retention of the earthbox in front of the equipment was not looked on with any great favour. It was designed to minimize the destabilizing effect of recoil at low elevations, and had to be filled with up to 20 tons of earth.



Above: May 1918, and a 12-in howitzer is firing somewhere near Louez. Note that the blast has kicked up dust from an area several yards around the equipment. The longer barrel gives the howitzer a greater range than earlier models.

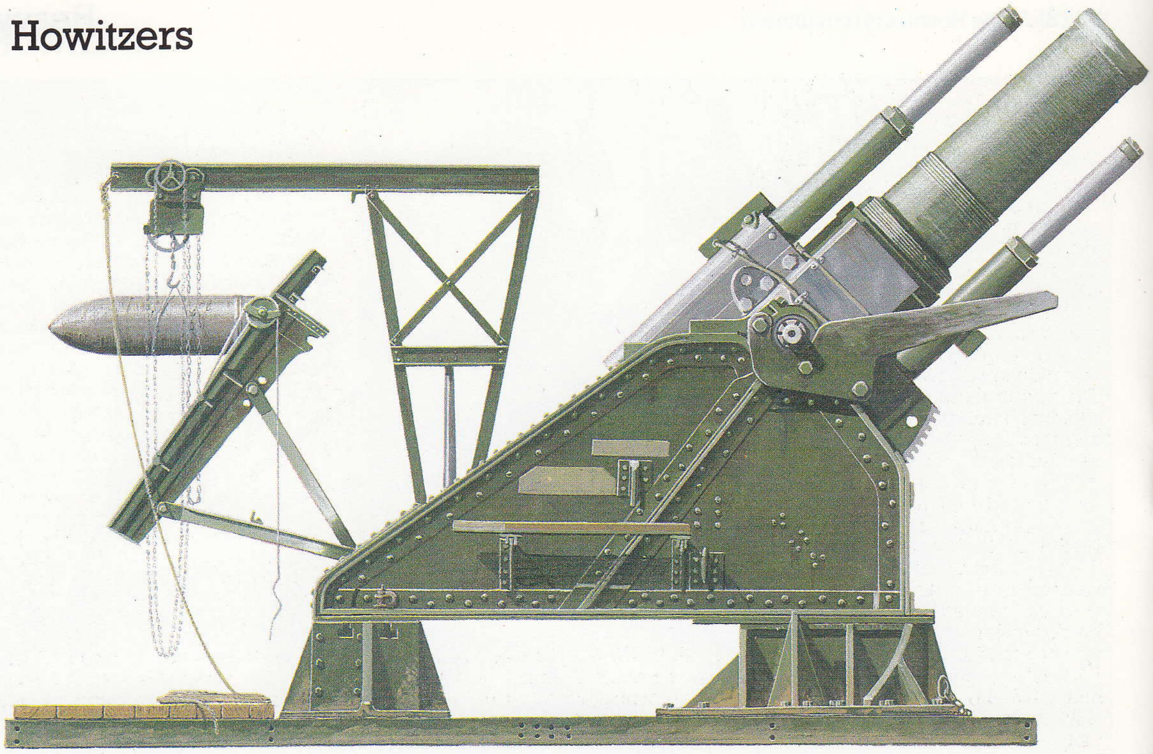


Above: A typical artillery position of 1917. From the number of 12-in shells ready for use, it would seem that a pre-offensive barrage is being prepared, possibly for dawn the next day. The camouflage was necessary to prevent aerial observation.



UK

15-in BL Siege Howitzers



Above: Arising from a private venture, the 15-in BL siege howitzer first saw action in the hands of the Royal Navy contingent on the Western Front. Maximum range was limited to less than 10000 m (10,936 yards), but the projectile weighed some 635 kg (1,400 lbs).

The British army at no time requested a 381-mm (15-in) howitzer, but was presented with such a weapon. Exactly how this came about is an odd story, but it had its origins in the Coventry Ordnance Works, which as a private venture took the 233.7-mm (9.2-in) howitzer as a starting point and enlarged it. One of the directors of the Coventry Ordnance Works was a recently retired senior naval officer, who contacted the Admiralty in order for them to pass on the news of the existence of the enlarged weapon to the War Office, rather along the lines of the 'Old Pals Act'. Instead the news fell upon the ears of the then First Lord of the Admiralty, Winston Churchill, whose ever-active mind soon thought up a role for the big howitzer as part of a Royal Navy presence on the battlefields of the Western Front, and a single example of the Coventry gun was obtained.

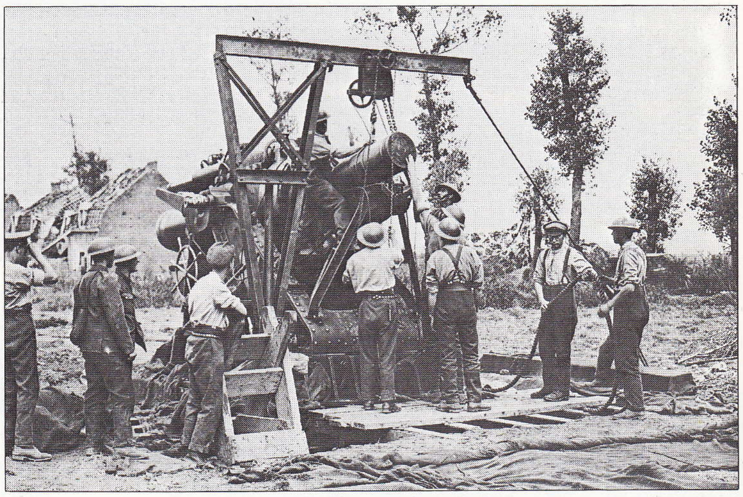
Thus arrived on the military scene the **15-in BL Siege Howitzer**. In a very short time the howitzer was in France in the hands of a Royal Marine Artillery crew and in action. A further 11 were then ordered and delivered into Royal Marine hands. The Royal Navy made much of the howitzers' capabilities, but experience soon showed that it had fathered something of a problem.

The main difficulty was that the 381-mm (15-in) howitzer was a large and ponderous brute that lacked the range that would be expected from such a large-calibre weapon. It was true that it could fire a projectile weighing no less than 635 kg (1,400 lb) with dreadful effects on the receiving end, but the maximum range was a mere 9870 m (10,795 yards). The howitzer required a crew of no less than 12 men on the gun, and even more were involved in the weighty task of ammunition supply.

In 1916 the Royal Navy apparently tired of the whole scheme and withdrew, presenting the 12 howitzers to an unwanting Royal Artillery, which had to accept them with good grace for inter-service political reasons. But once the Royal Artillery had time to examine its new charges it lost no time in announcing that it was none too pleased about performance. The Royal Artillery considered the howitzers to be too large and too heavy for the results and range that could be obtained. And at the ranges involved they were obvious targets for counter-battery work, so disproportionate care and consideration was required for their siting in locations close to the front lines. But the weapons had to be put to some form of use, so they saw the war out at odd times and locations whenever targets could be found in situations where the howitzers' dire lack of range was of little account. As soon as the war ended they were quickly withdrawn from use and disposed of, apparently to the White Russian forces during the Russian Civil War of the early 1920s.

Specification

15-in BL Siege Howitzer
Calibre: 381 mm (15 in)
Length of barrel: 4.19 m (13 ft 9.05 in)
Weight: in action not known
Elevation: +25° to +45°
Traverse: 25°
Muzzle velocity: 340 m (1,117 ft) per second
Maximum range: 9870 m (10,795 yards)
Shell weight: 635 kg (1,400 lb)



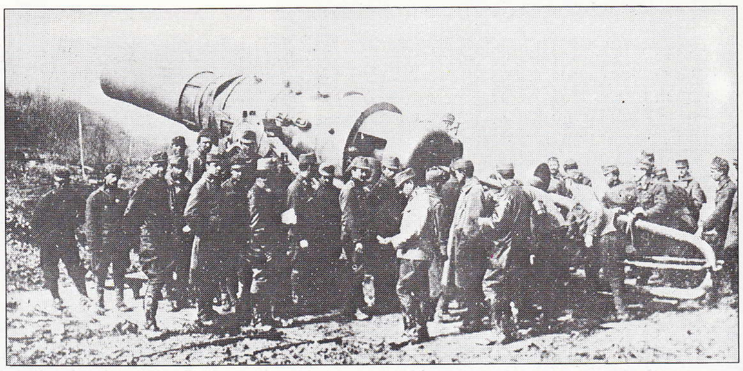
The 15-in howitzers were all transferred to the Royal Artillery, who were not enthused with their performance. Here a shell is being loaded into the breech of a 15-in near Ypres in September 1917.

AUSTRIA-HUNGARY

Skoda howitzers

During the years that led up to World War I the Skoda concern, based at Pilsen in what is now Czechoslovakia, was well to the fore in the development and manufacture of super-heavy artillery. Like so many other nations in Europe during that era, Austria-Hungary faced the prospect of having to smash through the rings of massive fortifications that protected the main centres of the empire's potential foes, and as the fortifications grew heavier so did the weapons to defeat them. By 1911 Skoda had already produced a 305-mm (12-in) howitzer that was the equal of any comparable weapon in Europe, and this stubby howitzer fired a 382- or 287-kg (842- or 633-lb) shell capable of penetrating the heaviest protection of any fort.

This **Skoda Model 1911** was an important design in that it was one of the first of such heavy howitzers to be designed from the start with motor traction in mind. Each of the howitzers could be broken down into three main loads, the barrel, the firing platform and the main carriage. The barrel and the main carriage could be towed by a massive Austro-Daimler tractor along roads at a ponderous but steady pace over considerable distances. By 1911 such tractors were not unusual, though the designing of a heavy howitzer for such traction was novel and so attracted much attention. The howitzers were organized into two-howitzer batteries with two gun-carriage tractor loads and another tractor pulling the two firing platforms. On each towed load sat crew members to operate the brakes, while further tractors pulled



The Skoda model 1914 was produced as a coast defence howitzer, but during the campaigns in northern Italy the 4.2-cm piece was used as a fortress smasher. Rate of fire was only two shells per hour.

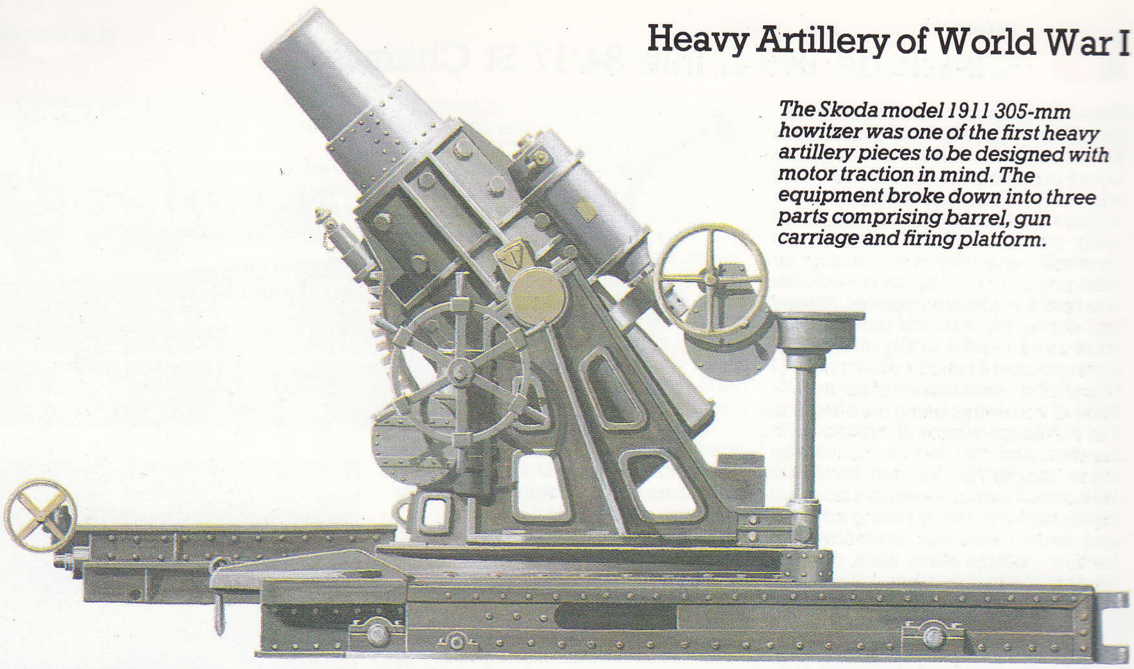
Skoda howitzers (continued)

ammunition, assembly cranes, tools and even a special mobile workshop. More trucks carried such items as fire-control instruments, the battery's rations and offices and so forth. Mobile batteries such as these were used in the crushing of the Belgian forts in 1914 (along with the Krupp 42-cm/16.54-in 'Big Berthas') and were later used during the Verdun battles and the campaign in Italy.

Once World War I was well under way the need for even heavier artillery became apparent and Skoda went on to produce larger-calibre weapons. The first of these was ready in 1914, although it was not a field howitzer but a coastal artillery piece intended for use inside armoured turrets. The calibre of this **Skoda Model 1914** was 420 mm (16.54 in), the same as that of the Krupp howitzers, but despite the Model 1914's intended employment the type was used on occasion as a weapon to demolish heavy fortifications during the campaigns along the border with northern Italy. Some survived as coastal artillery weapons until World War II. Moving the massive 420-mm (16.54-in) howitzer was a huge task, so in 1916 Skoda introduced a more formal howitzer design for use in field conditions. Even so this was still a very hefty 420-mm (16.54-in) howitzer that took days to emplace or to move, and it was not until 1917 that a 420-mm (16.54-in) design intended from the outset for relatively easy movement and emplacement was ready. This was the **Skoda Model 1917**, which was in many ways the same piece as the Model 1916 but designed so that the individual loads could be towed by large wheeled tractors. The total weight of the emplaced Skoda Model 1917 was well over 100 tonnes, and on the road the combined loads came to far more than that. The rate of fire was only about one or two rounds per hour, but the heaviest shell weighed no less than 1000 kg (2,205 lb) and the maximum range was 14,600 m (15,965 yards).

Skoda also produced in 1916 a **Skoda Model 1916** 380-mm (14.96-in) howitzer which was nicknamed 'Barbara'. It too was designed for motor traction, but few such weapons were actually built.

After 1918 the 305-mm (12-in) howitzers still around were distributed among the new nations that grew out of the old Austro-Hungarian Empire. Most went to Hungary and Czechoslovakia, but Italy also received some along with a few of the 420-mm (16.54-in) coastal howitzers.



The Skoda model 1911 305-mm howitzer was one of the first heavy artillery pieces to be designed with motor traction in mind. The equipment broke down into three parts comprising barrel, gun carriage and firing platform.

Specification

Skoda Model 1911
Calibre: 305 mm (12 in)
Length of barrel: 3.03 m (9 ft 11.3 in)
Weight: in action 20830 kg (45,922 lb)
Elevation: +40° to +70°
Traverse: on carriage 16°
Muzzle velocity: with heavy shell 340 m (1,115 ft) per second
Maximum range: with light shell 11300 m (12,360 yards) and with heavy shell 9600 m (10,500 yards)
Shell weight: 287 or 382 kg (633 or 842 lb)

FRANCE

Canon de 220 L mle 1917 Schneider

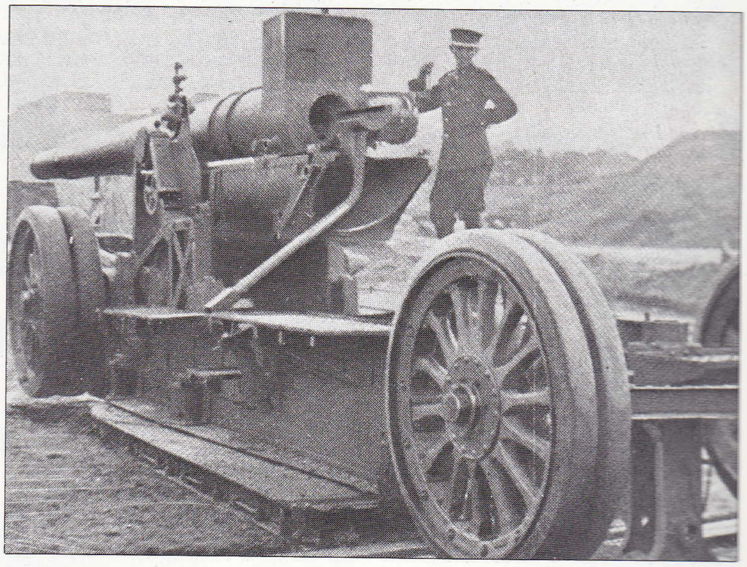
Before 1914 the French military philosophers who dictated the nature of the French army training and tactics decided that as fast attack was to be the main strength of the French army there would be little need for heavy artillery, whose main purposes were defence or slow attack. The 75-mm (2.95-in) mle 1897 field gun was all that would be needed as massed French infantry swept all before them, so scant attention was given to the provision of heavy weapons before the start of World War I. The 1914 Battle of the Frontiers demonstrated in a terrible fashion the fallacies behind such thinking, and the battered French army withdrew behind the trench lines that were to be the virtual 'trade mark' of World War I.

Once in its trenches, the French army soon discovered that heavy artillery was sorely needed. The concentration on the '75' as a weapon for all tasks proved to be a major blunder, for against protected earthworks field guns such as the '75' were virtually useless. Heavier-calibre weapons were needed to destroy trench lines and bunkers, and the French army had but few. The only sources for such weapons were from the batteries situated all around the French coastline, and from the nation's ancient forts. Heavy guns were stripped from these sources and it was with these elderly weapons that the French army withstood the rigours of the dreadul Verdun battles of 1916.

Better weapons were demanded, but it took time for these to be produced for the French designers had to work virtually from scratch. Developing and manufacturing new heavy weapons took years and it was not until 1917 that Schneider was able to deliver the first of its heavy offerings, a gun known as the **Canon de 220 L mle 1917** or the **Can 220 L 17 S**. It had a calibre of 220 mm (8.66 in) and was a derivative of a naval gun design. It had a long slender barrel and was mounted on a long heavy carriage in such a way that the barrel slid in its cradle back along the length of the carriage when the gun was fired. The L 17 S was a heavy weapon that had to be towed in two loads (the barrel and the carriage) but it had a very good range of 28,800 m (24,935 yards) and fired a shell weighing 104.75 kg (231 lb).

In action the L 17 S proved to be an excellent heavy weapon but it arrived on the battlefields of France only just in time. By mid-1917 the French army was in such a state following the lethal maulings of the Verdun battles that large sectors openly mutinied and refused to fight further. For some reason the Germans never got to hear of the mutinies, and for long periods were held at bay only by the artillery. The French artillery arm was relatively untouched by the mutinies and fought on using the L 17 S and other such heavy weapons until the troubles were resolved and the French army once more settled down to face the enemy. Thus the L 17 S may be regarded as the gun that helped to save France in the desperate troubles of 1917, but went on to play its part during the battles of 1918.

By 1918 the L 17 S was one of the better of the many types in the French artillery gun park and it was retained until 1940, when the many examples still around fell into the hands of the Germans, who used them as coastal guns emplaced in the Atlantic Wall. Some saw action again during the Normandy landings of June 1944.



The Schneider Canon de 220 L mle 1917 was derived from a naval weapon. The long-barrelled gun was the first new design to enter French army service in place of the largely obsolete coastal artillery, which had been a stopgap in 1914.

Specification

Can 220 L 17 S
Calibre: 220 mm (8.66 in)
Length of barrel: 7.67 m (25 ft 2 in)
Weight: in action 25880 kg (57,055 lb)
Elevation: −10° to +37°
Traverse: 20°
Muzzle velocity: 766 m (2,513 ft) per second
Maximum range: 22800 m (24,935 yards)
Shell weight: 104.75 kg (231 lb)

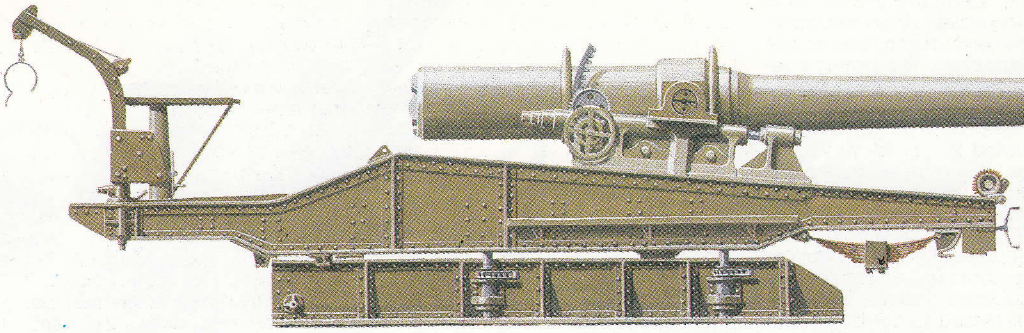
FRANCE

Canon de 240 L mle 84/17 St Chamond

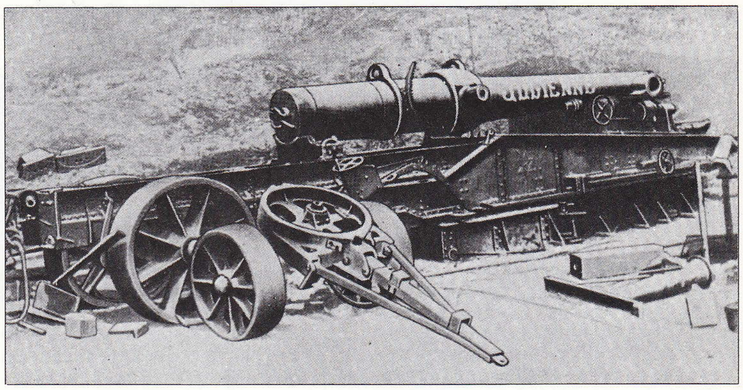
One of the early candidates considered for stripping from the French fortifications of an earlier era was a heavy gun known as the mle 1884. This was a St Chamond design with a calibre of 240 mm (9.45 in), but in the early part of 1915 the weapon was generally considered too heavy for field use by conventional means and was thus mounted on special railway gun carriages. As such the weapons were as successful as any of the other extemporized French railway guns of the period. But railway guns have a habit of not always being able to get to the locations where they are most needed, and this lesson was driven home during the Verdun battles of 1916, which settled down to a slogging match between the opposing artillery, and under such circumstances the heavier calibres were often of more use than the longer-ranged guns. Thus a call went out to mount the St Chamond 240-mm (9.45-in) guns on to some form of field carriage.

The new carriage was delivered during 1917 and the gun and carriage combination became known as the **Canon de 240 L mle 84/17 St Chamond** or **Can 240 L 84/17 St Ch**. By that time there were few of the original mle 1884 guns available, so the guns were placed back in production (these were known as **Can 240 L mle 1917 St Ch**). The best that could be said of the resultant weapon was that it was a ponderous item. The gun barrel had to be towed separately from the carriage, and on the road both were long and awkward loads. The usual towing vehicles appear to have been steam tractors; these endowed the weapon with a very limited cross-country capability unless special roads were laid, and the time to assemble or dismantle the gun often had to be considered in days.

Because of its age, the range of the L 84/17 was limited to 17300 m (18,920 yards), but the ordnance fired a 161-kg (355-lb) shell of considerable power. The numbers produced during 1917 and after appear to have been limited, no doubt as a result of the time required to manufacture the large barrel and carriage.Tthe new barrels produced in 1917 were slightly longer than the original but had the same performance, so they were still relatively unworn when the Armistice was signed in November 1918. At least two or three batteries were retained up to 1940, but in that year the Germans demonstrated that the L 84/17 was a leftover from another era by destroying all the remaining weapons with Stuka dive-bombers, most of them while they were still on their road carriages.



Above: The Canon de 240 L mle 84/17 St Chamond was originally a fortress weapon dating from 1884. First attempts at making the weapon mobile involved a railway mounting, but by 1917 a field mounting had been developed.



Right: The barrel of the Canon de 240 L mle 84/17 was easily detachable from the carriage. Movable in two loads, the great length of the equipment made for an extremely awkward load, and setting up a position could take several days.

Specification

Can 240 L St Ch

Calibre: 240 mm (9.45 in)

Length of barrel: mle 84/17 6.70 m (22 ft) and mle 1917 7.00 m (22 ft 11.6 in)

Weight: in action 31000 kg (68,343 lb)

Elevation: 0° to +38°

Traverse: 10°

Muzzle velocity: 575 m (1,886 ft) per second

Maximum range: 17300 m (18,920 yards)

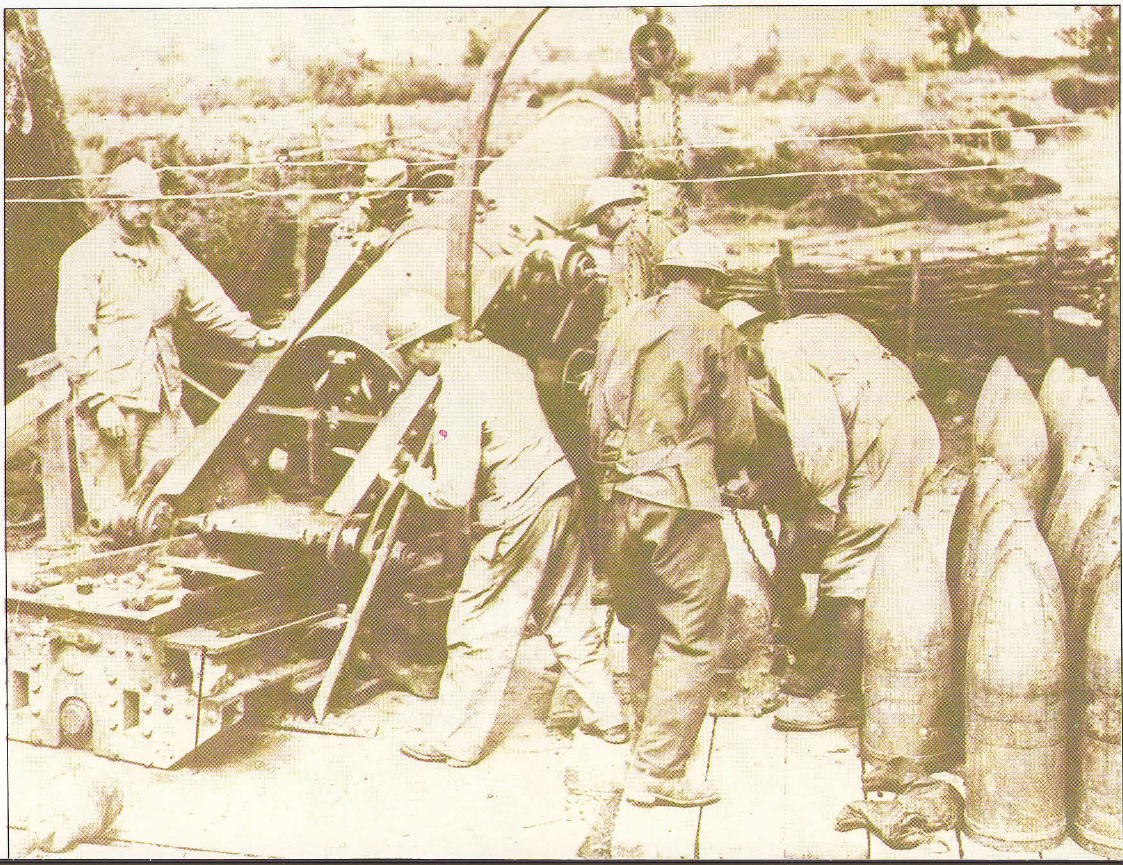
Shell weight: 161 kg (355 lb)

FRANCE

Mortier de 280 mle 14/16 Schneider

The years up to 1914 were not entirely devoid of heavy artillery activity for the French armaments industry. The large Schneider concern continued with its full range of artillery development, mainly funded from internal sources in order to keep abreast of design influences elsewhere and to remain ready to seize upon any possible sales opportunities that might arise. Thus in 1914 it had ready to hand a design for the 280-mm (11.02-in) **Obusier de 280 mle 1914 Schneider** that was soon accepted for service by a French army eager to improve its heavy artillery holdings.

It was two years before Schneider could deliver the first examples, however. By then the howitzer's designation had been decided as **Mortier de 280 mle 14/16 Schneider**, the term *mortier* (mortar) in place of *obusier* (howitzer) being a typical piece of European terminology as on the Continent heavy howitzers were frequently



The Mortier de 280 mle 14/16 was a ponderous piece designed for siege warfare. Range was limited, which placed the howitzer well within the range of German long-range guns. Indeed, many suffered from counter-bombardment.

called mortars. As the type was ordered 'off the shelf', the French army had to take what they got and what they got was a very ponderous weapon. The original mle 1914 as produced by Schneider had been designed as a heavy artillery piece that would be used for siege warfare, in which plenty of time would be available for the move to the battlefield and more time for the emplacement. Thus the mle 14/16 had to be broken down into no less than four loads for travelling and in position for firing rested on a heavy metal firing platform. Ammunition was delivered to the breech by means of a little crane which lifted the shell on to a small trolley that ran along a pair of rails to the breech. Ramming the shell into the breech was carried out by a chain-driven rammer.

Once the assembly lines for the mle 14/16 had been established the units were churned out in relatively large numbers. Many suffered from enemy counterbombardment as the range was only 10950 m (11,975 yards), putting the type well within the reach of many of the German long-range guns. The mle 14/16 was nonetheless a very useful weapon for destroying trench systems and underground installations, though it cannot have been a very popular weapon with the French gunners. Every move, however short, entailed the lengthy and involved job of breaking down the howitzer into four loads, and once on site a pit had to be dug for the heavy steel platform, together with a deeper pit to allow the barrel to recoil when the howitzer was fired at high angles of elevation.

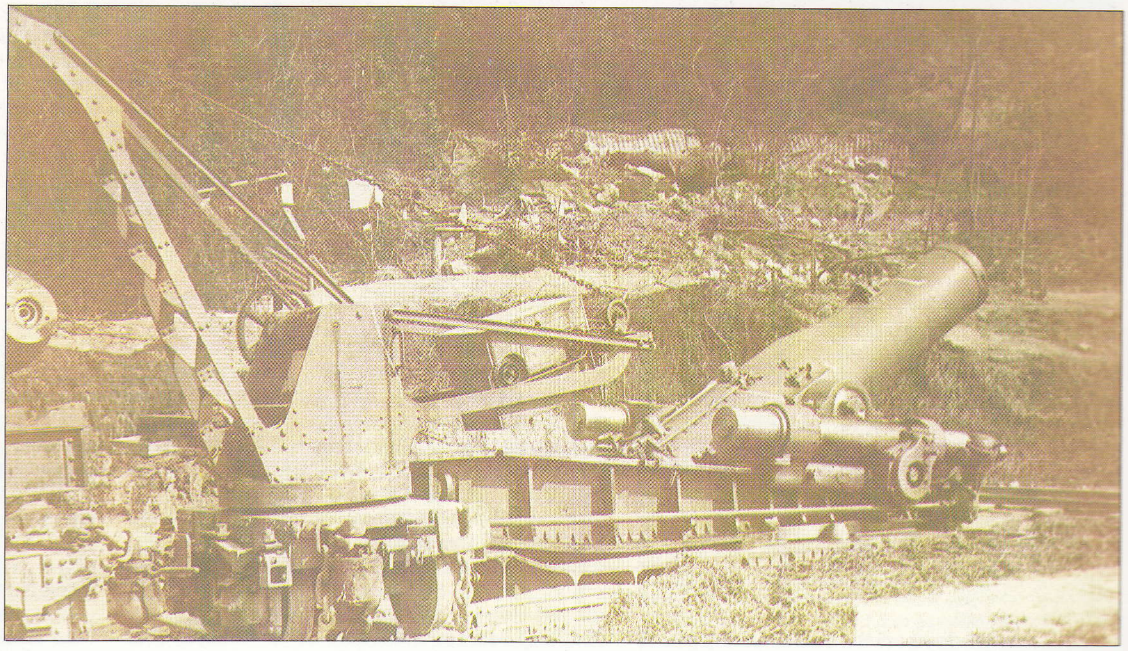
After 1918 the mle 14/16 was one of the types selected to remain in service. Thus some were still around in 1940. By then they belonged to a past generation and had no chance for effective use as the German Panzers rolled across France. Many mle 14/16s were captured intact and were added to the German army 'siege train', being used once again during the siege of Leningrad and later during the siege of Sevastopol, where their weight and bulk were no disadvantage. Thus the mle 14/16 ended up in the hands of the enemy it was originally procured to defeat.

Specification

Mortier de 280 mle 14/16 Schneider
Calibre: 280 mm (11.02 in)
Length of barrel: 3.35 m (11 ft 0 in)
Weight: in action 16000 kg (35,274 lb)
Elevation: +10° to +60°
Traverse: 20°
Muzzle velocity: 418 m (1,371 ft) per second
Maximum range: 10,950 m (11,975 yards)
Shell weight: 205 kg (452 lb)

FRANCE

Mortier de 370 Filloux



Above: A French 370-mm howitzer in position in the Ravin de la Baraquette west of Foucaucourt, seen in September 1916. The great battles of that year saw artillery become the great mankiller of an already murderous war.

The **Mortier de 370 Filloux** had its origins in a requirement for a coastal artillery weapon capable of producing plunging fire to pierce the relatively thin protection of warship decks. By 1913 a number of these short howitzers that fired at high angles of elevation had been produced, but in 1913 the 370-mm (14.57-in) weapon was produced and this remained thereafter the largest of all these French specialist weapons.

In appearance the Mortier de 370 Filloux was a deceptively small weapon. In fact it was a brute. It had originally been designed for use in static coastal emplacements where (in theory at least) it was to have been delivered, emplaced and thereafter left. What actually happened was that in the period following the early carnage of 1914, the French army rushed whatever it could find in the heavy artillery line to the areas behind the trenches in order to have some trench-crushing capability, however limited. Fortunately for the French, when the Mortier de 370 was delivered it came with special handling gear of two kinds. One was for use on railway trucks and the other for road transport and both had handling gantries, cranes and special rigs. The largest of these rigs was for the barrel, which was carried slung under a special wheeled gantry; the other loads were carried slung in a similar fashion. In all there were three main loads with more for the ammunition and the various accessories.

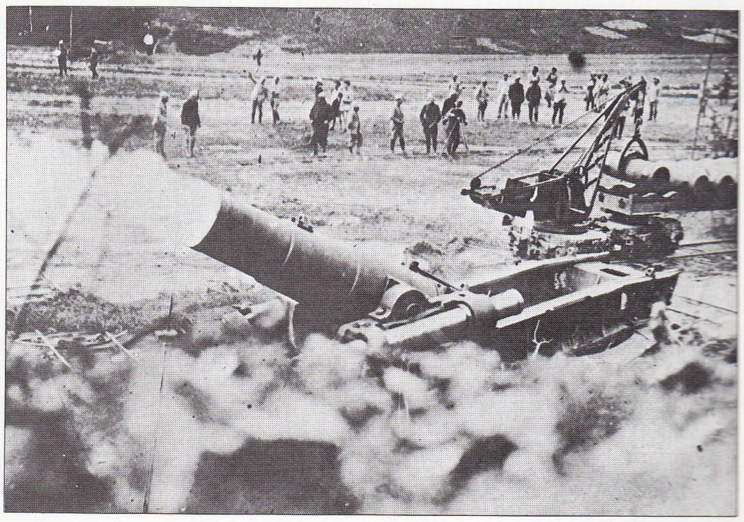
If moving the Mortier de 370 was not enough, emplacing the thing was worse. The preparation began with the digging of a large pit into which was lowered the main firing platform: this had a series of vertical spades on its underside which were intended to absorb some of the barrel recoil. More of the recoil was taken by the heavy carriage, which was mounted on the platform and featured a rudimentary recoil cylinder system coupled to the trunnions of the barrel. The emplacement and assembly of all this took a considerable time and a great deal of labour, but it was a price the French had to pay in order to put some form of heavy artillery in the front line during 1915.

Once in the line the ammunition for the howitzer was gradually changed from the original armour-piercing pattern to a heavy blast-producing type; the last of these projectiles was introduced into use during 1917. There were two of these 1917 type projectiles, the heavier weighing 489 kg (1,078 lb). But with this the range was only 8100 m (8,860 yards), which made all the labour involved rather a waste of potential. But for a considerable period it was all that there was to hand and the unfortunate French gunners just had to put up with it all.

After 1918 the Mortiers de 370 Filloux were placed into storage to be dragged out again during the 'Phoney War' of 1939-40. There then appears to have been some indecision as to exactly where they were to be emplaced, and in the event most of them were apparently destroyed by Luftwaffe attacks.

Specification

Mortier de 370 Filloux
Calibre: 370 mm (14.57 in)
Length of barrel: 3.31 m (10 ft 10.3 in)
Weight: in action between 29000 and 30000 kg (63,934 and 66,139 lb)
Elevation: −6° to +65°
Traverse: 6°
Muzzle velocity: with light shell 370 m (1,214 ft) per second and with heavy shell 316 m (1,037 ft) per second
Maximum range: with light shell 10400 m (11,375 yards) and with heavy shell 8100 m (8,860 yards)
Shell weight: 413.5 or 489 kg (911.6 lb or 1,078 lb)



Simple in appearance, the Mortier de 370 Filloux was a brute to handle, and its heaviest projectiles had a range of only 8100 m (8858 yards). As was true of so many heavy artillery pieces of the period, the 370-mm was originally a coast defence weapon.

Verdun 1916

The titanic struggles of 1916 have gone down in history as perhaps the most tragic waste of human life the world has seen. Arising out of a need to overcome strong defences by frontal assault, attrition was appalling, decimating a generation and looming large in the memories of those who survived. Of the campaigns of World War I, it is Verdun which probably casts the darkest shadow.

The Battle of Verdun lasted from February 1916 until it finally petered out in the December of the same year. It can be regarded as one of the greatest battles of all time, for although other battles involved more men and equipment, or produced greater results for one side or the other, the Battle of Verdun was a conflict that maintained its ferocity and scope through many months to reach a pitch where it seemed that the very vitality and honour of the two combatant nations was being put to the test. The result was horrific in the extreme for the unfortunate soldiers sucked into the maelstrom of the area around the old city of Verdun: they existed and died in a hell on Earth where they were rarely able to catch a glimpse of their prime adversaries, for these were the guns.

The Battle of Verdun had its origins in the mind of the German Chief of the General Staff, General Erich von Falkenhayn. By the end of 1915 the German and the Allied armies faced each other across the trench lines of the Western Front with little immediate prospect of either ever being able to break the stalemate, though neither side would admit it at the time. The war by then had already regressed into a state of attrition where the only way either side could win was by reducing the manpower and equipment strength of the other by sheer weight of repeated destruction. In effect this meant the use of artillery, for infantry alone could make little impression against the powerful defences of the other side. But Germany was not in a position to win such a war, mainly as a result of the Allied blockade of raw materials, so Germany had to make some sort of move to destroy a major part of the Allied strength during 1916 or face the prospect of a possible defeat.

Falkenhayn devised the notion of a gigantic 'mincing machine' battle that would destroy the French army. His idea was simple in the extreme but horrific in its execution: the German forces would make limited attacks against the salient around Verdun to suck in more and more of the French army, which would then be gradually destroyed by the German artillery on a chosen killing ground. Falkenhayn's concept was logically sound in a terrible way, but as things turned out the concept of his own army's limited attacks were somehow never imparted to his subordinate commanders, among whom was the Kaiser's son. Additionally, he and his staff regarded the attacks in this area as a matter of honour in that Verdun should be taken. Thus as more French troops were sucked into the fighting so too were more German troops, until the point was reached where as many Germans were being fed into the 'mincing machine' as there were French, and in this way the two armies slugged it out through many dreadful months.

The Verdun battlefield was divided into two almost equal halves by the River Meuse. Falkenhayn originally dictated that his 'limited attacks' should take place on the east bank only. The opening attacks were to be preceded by a barrage from the largest concentration of artillery yet seen on the Western Front, for Falkenhayn had gathered together no less than 1,220 artillery pieces to lay down fire on a front only 13 km (8 miles) long. Of these there were 542 heavy pieces and 306 field guns along the immediate front to be attacked, together with 152 heavy mine projectors. The rest of the artillery force was assembled along the flanks.

Largest in calibre of all this massed artillery were 13 420-mm (16.54-in) 'Big Berthas'. Much was expected of these weapons, but in the event their accuracy was less than anticipated. But this was to matter little, for hidden away in the covering branches of the Bois de Wapremont were two of the massive 380-mm (14.96-in) guns taken from coastal defences away in the Baltic. Further forward were 17 of the 305-mm (12-in) Skoda howitzers that had done so well against the Belgian forts in 1914. When it came to the smaller calibres the numbers of artillery pieces began to grow. Next down from the 305-mm (12-in) howitzers were the 210-mm (8.27-in) *Mörser* (mortars or howitzers) that were to become one of the most widely used German weapons of the Verdun battles. They were greatly feared by the French soldiers, who had an equal dislike for the 130-mm (5.12-in) heavy guns that were really naval pieces mounted on field carriages. Their high muzzle velocity was such that the projectiles arrived on target with no presaging sound signals. The mine projectors were essentially short-range weapons that fired huge canisters of explosives (packed with all manner of scrap metal to enhance their nastiness), while more short-range support was supplied by the 105-mm (4.13-in) and 77-mm (3.03-in) field pieces of the field artillery. If all this was not enough there was also the might of the massive 420-mm (16.54-in) Gamma howitzer hidden away with the 'Big Berthas' behind the hills of Morimont and Romagne.

All this massed firepower opened up on the morning of 17 February 1916. The 420-mm (16.54-in) mortars were used to fire against the ring of forts that surrounded Verdun, and from that day onward they worked their way over and around the individual forts, though with far less effect than they had obtained against the Belgian forts in 1914. The 380-mm (14.96-in) naval guns opened up a harassing fire against the city of Verdun itself and its approach routes, at times managing 40 shells per day from each gun. But it was the lesser calibres that were used against the hapless French lines, the 210-mm (8.27-in) howitzer batteries being especially notable. In places they were situated at intervals of one battery to every 150 m (165 yards) of opposing trench, and they wrought fearful havoc. The French trench lines in certain sectors simply ceased to exist, along with their unfortunate defenders.

At the same time as short-range fire fell upon the trenches, the longer-range artillery began to spray the recognized French artillery positions with gas. So meticulous had the German artillery preparation been that they even had reserve 150-mm (5.9-in) batteries standing by to open fire on any French battery that might not have been spotted or that somehow evaded the initial gas saturation. They had little enough to do. At that stage of the war the use of gas was still a relative novelty and the French were ill-equipped to deal with its effects.

The overall effect of the initial bombardment was dramatic: large holes were punched through the French lines through which the advancing infantry could pass, but here and there some French positions had somehow survived the hail of steel and put up a fierce resistance. It was a harbinger of what was to come. No matter how fiercely the artillery fired there were always some positions left undamaged, and from these the occupants could crawl to open fire on the attackers, as happened time and again in the long days, weeks and months that lay ahead. But 17 February was a foretaste of what was to come, for the artillery that had been so carefully amassed by Falkenhayn was to remain in place almost throughout the battle.

By 23 February the Germans had made their breakthrough, although at that stage reinforcements were carefully husbanded and fed into the battle at a limited rate in order to lure the French into the 'killing ground'. But it was not long before this carefully planned sequence began to run out of control. By the end of the month the mighty Fort Douaumont had fallen into German hands almost by default, and as Douaumont was one of the king pins of the armoured ring around Verdun this was heralded as a major victory. Thereafter things began to increase in intensity, if such a thing were possible, for a breakthrough to Verdun itself seemed increasingly likely.

This impression was enhanced by the close investment of Fort Vaux, which in the event

A battery of German 210-mm howitzers. Once troops began burrowing into the ground on the western front, the howitzer came into its own. Its high angle of fire enabled it to drop shells right into a trench or bunker, with even a near miss able to collapse a position.

Despite the enormous weight of fire directed at Vaux, the fort's structure survived, the garrison only surrendering when their water ran out. The French concluded that if a fort was well provisioned it could hold out indefinitely, leading to the philosophy of the Maginot Line.

managed to hold out for weeks until 7 June. From Fort Vaux the suburbs of Verdun appeared to be almost within reach but it was around this stage that the battle took on a tempo of its own. In order to turn the conflict into a major German victory more and more units were thrown into the attack and the fighting spread to the west bank of the Meuse following a bombardment similar to that which opened the battle. This attack also came to a halt on the slopes of the aptly named hill called Le Mort Homme and Côte 304.

But they got little further as the battle raged on, absorbing ever more men while at the same time producing increasingly less in the way of gains. As the German infantry attempted to edge further forward across ground churned into a morass by the rain of incessant shelling they found advances more difficult to obtain. Instead, the guns continued their constant barrage from both sides, for soon after the initial German attacks the French had brought up more of their own artillery, in places denuding their front in order to supply weapons. The French had few really heavy weapons to emplace. Instead they relied on huge volumes of fire from their famous '75' field guns backed up by numbers of 105-mm (4.13-in) field guns and 155-mm (6.1-in) guns and howitzers. Only later were they able to bring up railway guns and heavier pieces.

A matter of honour

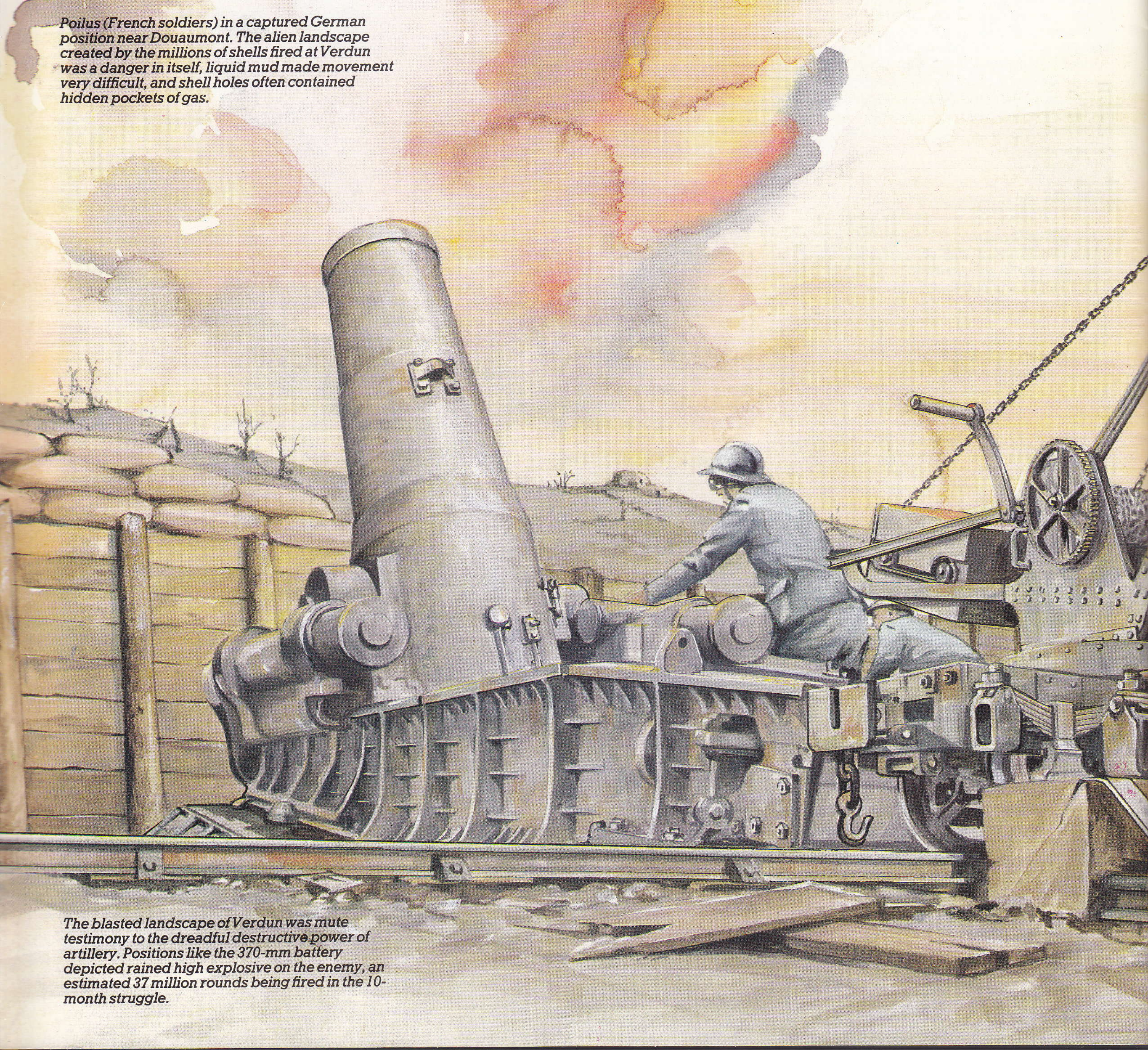
Ammunition for all these French batteries was a constant headache for the French staff officers, for they had only one logistic road as the Germans commanded the others. This road was the famous Voie Sacrée to Souilly and Bar-le-Duc, and along it had to pass all the supplies and reinforcements for the French front. It was a road that many French soldiers took only once, for vast numbers died at Verdun: French official figures later put the casualties at 377,231, although the true total was probably much higher at 542,000. On the German side most references seem to agree on a figure around 434,000, the combined total of casualties being around 976,000. Many of these were caused by the artillery alone, for thousands died without even seeing the enemy they sought so desperately to fight. And they did want desperately to fight, for by mid-1916 the battle of Verdun had assumed the nature of a gigantic struggle between two ancient foes, in which the outcome became a matter of national

A border fortress for centuries, Verdun was no stranger to attack. The increasing power of artillery forced the French to build a chain of forts to keep enemy guns out of reach of the city, but by 1916 artillery ranges had increased again and Verdun was shelled heavily.

Poilus (French soldiers) in a captured German position near Douaumont. The alien landscape created by the millions of shells fired at Verdun was a danger in itself, liquid mud made movement very difficult, and shell holes often contained hidden pockets of gas.

pride and honour. Throughout it the artillery fired almost without cease, all the time pouring shells on to the forward and rear areas alike. The soldiers went underground whenever they could, taking shelter in such locations as railway tunnels and the basements and cellars of the villages like Douaumont and Fleury, villages that were simply wiped off the map by the artillery from both sides. The infantry emerged on occasion only to fight off the infantry attacks from the other side, and then went back to ground to attempt to avoid the shells they knew would come.

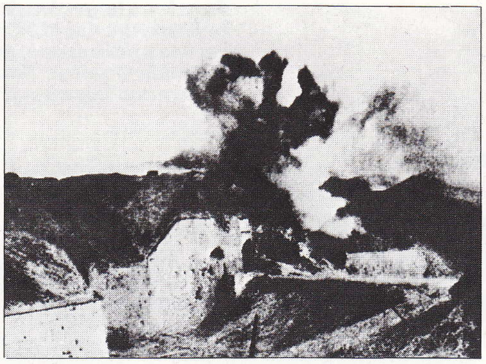
By June the battle was in a state of crisis. By sending in yet more men the Germans had advanced to Fleury after further artillery saturations of high explosive and gas. But this was the high point of their advance. During the conflict the original concept of the 'mincing machine' had been lost as events, rather than Falkenhayn, dictated the battle, and thereafter



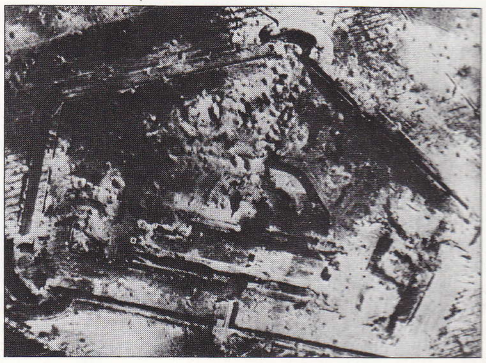
The blasted landscape of Verdun was mute testimony to the dreadful destructive power of artillery. Positions like the 370-mm battery depicted rained high explosive on the enemy, an estimated 37 million rounds being fired in the 10-month struggle.

the Germans were forced to fall back. By mid-July the French had somehow managed to push the Germans back to a line that was to remain until almost the end of the war. Fort Douaumont was retaken by 24 October, with the supporting fire of two 400-mm (15.75-in) railway guns and sporadic local attacks continued until December.

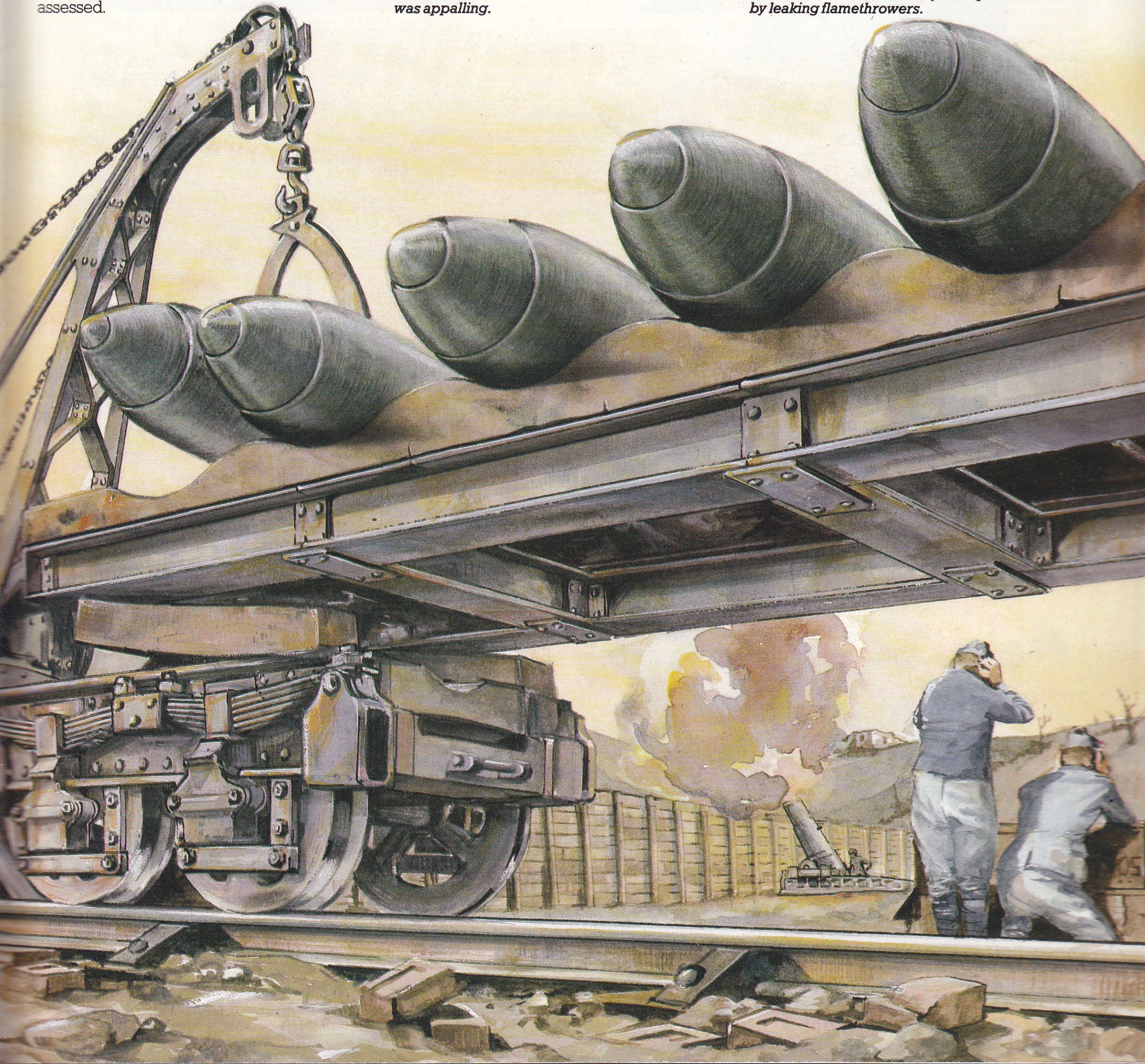
It had been a holocaust, dominated throughout by the artillery. Later references state that throughout it all the German guns fired off around 22 million rounds while the French returned about 15 million rounds. The result was a battle that haunted the minds of a whole generation of French and German people, caused the deaths of hundreds of thousands and has a dreadful effect on the minds of many to this day. The immediate result was that a few square kilometres of French soil changed hands, but the final results may never be fully assessed.



Fort Vaux under bombardment. The defenders of Vaux were subjected to some of the most intensive shelling of the war. They sheltered underground, protected by the massive concrete casemates, but the sheer volume of noise in the darkened tunnels was appalling.



Douaumont, February 1916. Down below, a series of underground levels were the scenes of some of the most ferocious fighting in French history. During an attempt to retake the fort, hundreds of Germans were entombed by an explosion caused by leaking flamethrowers.



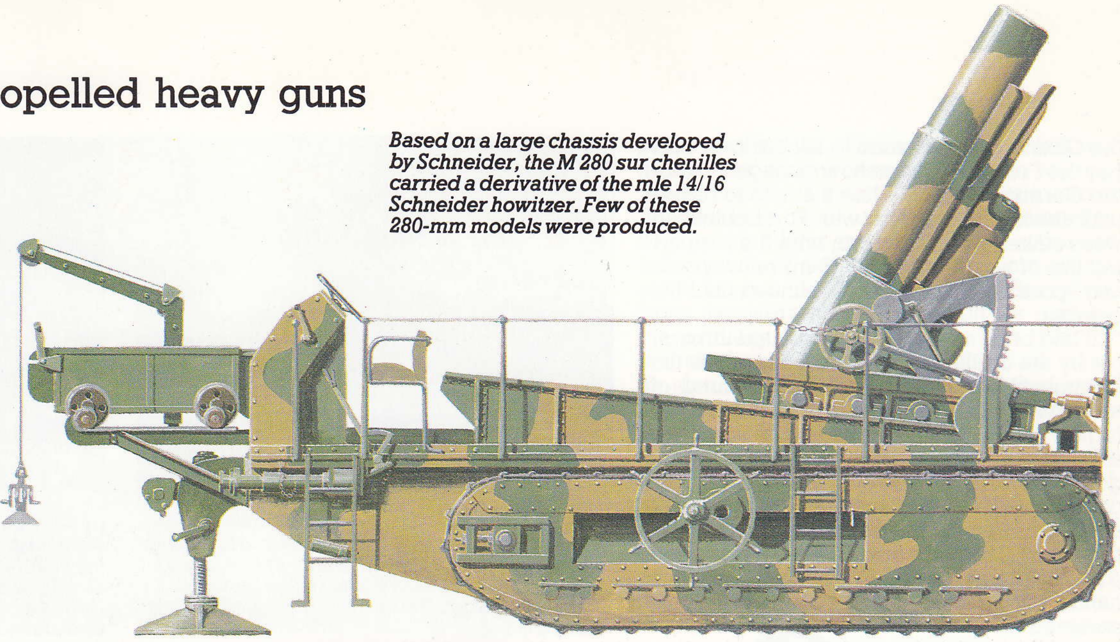
FRANCE

French self-propelled heavy guns

By 1917 one of the main problems suffered by the gunners of all nations engaged in the artillery war that by then prevailed, was the lack of mobility imposed upon them by the nature of the terrain and the ponderous weight of their charges. Whenever any sort of advance seemed likely opportunities were missed simply because the guns could not be moved up rapidly enough to positions from which they could provide the necessary support. All manner of experiments were conducted in efforts to remedy this state of affairs, but the only answer was soon seen to be caterpillar tracks, and if any emphasis were required it was provided by the advent of the tank.

Once the potential of the tracked carriage had been appreciated it was not long before the French were involved in a series of experiments to mount heavy gun barrels on to self-propelled tracked chassis. These experiments were carried out quite separately from the French tank programme, and involved a large tracked chassis developed by Schneider at its Le Creusot works. Early trials involved a 155-mm (6.1-in) gun, but this was later changed on production models to a long gun known as the **Canon de 194 mle GPF** (Grand Puissance Filloux, or High-Power Filloux). Another weapon carried by some of these carriages was the **Mortier de 280**, a derivative of the mle 14/16 Schneider, and this was also known as the **M 280 sur chenilles**.

These two weapons shared a common carriage driven by a petrol engine installed at the rear of the chassis. The driver sat at the extreme front with the barrel cradle almost immediately behind him. A small crane was provided to raise ammunition to the level of the crew platform behind the breech. The design had one drawback, the installation so arranged that ordnance elevation was somewhat limited (preventing the full range of the piece from being reached), but the mobility that the carriage provided more than made up for this. Later models were redesigned to achieve increased elevations.

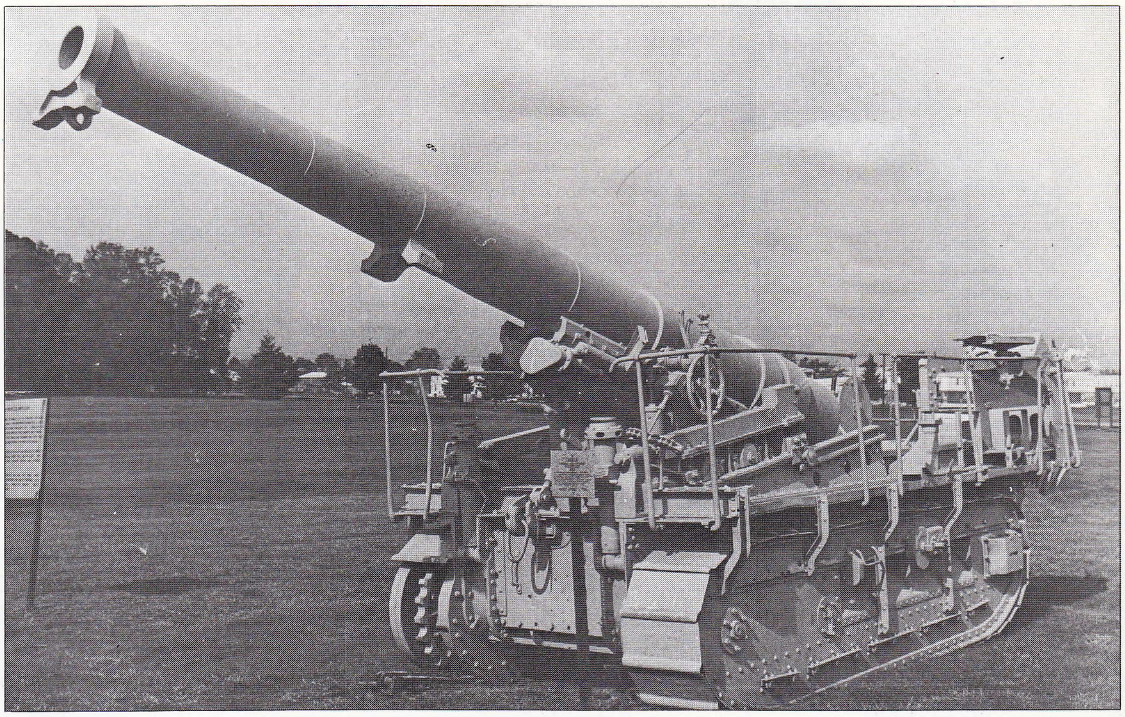


Based on a large chassis developed by Schneider, the M 280 sur chenilles carried a derivative of the mle 14/16 Schneider howitzer. Few of these 280-mm models were produced.

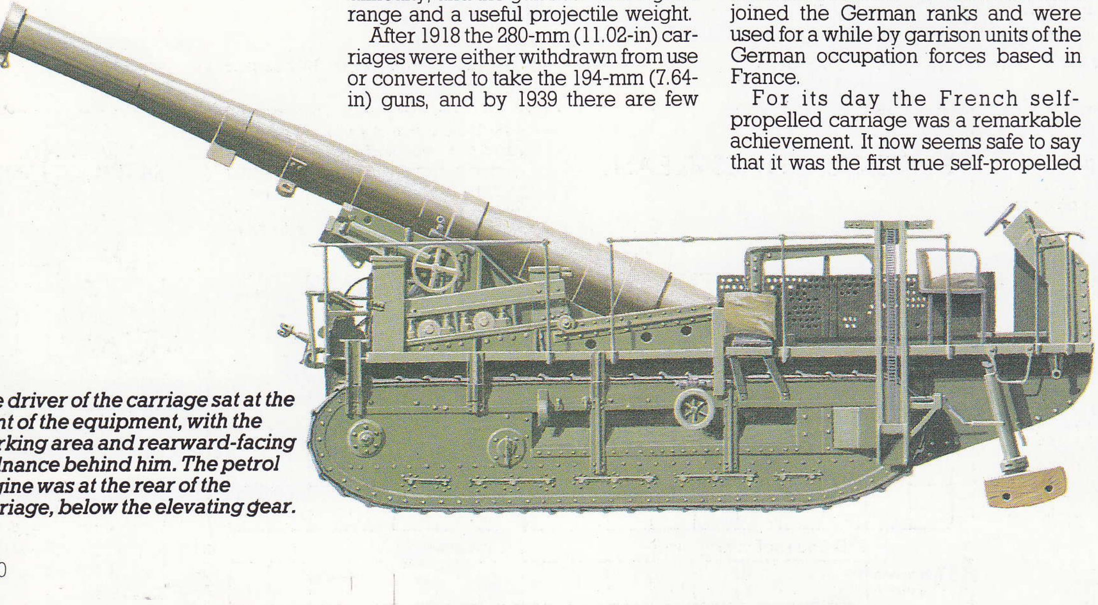
Not many of the 280-mm (11.02-in) models appear to have been made. Production was apparently concentrated on the 194-mm (7.64-in) model, but even so the main problem during the latter part of World War I was that there were never enough of them. Despite their bulk and weight they were able to cross terrain that no equivalent towed weapon could negotiate without difficulty, and the gun itself had a good range and a useful projectile weight.

After 1918 the 280-mm (11.02-in) carriages were either withdrawn from use or converted to take the 194-mm (7.64-in) guns, and by 1939 there are few records of any remaining in service. The 194-mm (7.64-in) model was still in use, and was fired in anger during the 1940 campaigns until overrun by the German Panzers. The survivors then joined the German ranks and were used for a while by garrison units of the German occupation forces based in France.

For its day the French self-propelled carriage was a remarkable achievement. It now seems safe to say that it was the first true self-propelled artillery platform to be used operationally in any numbers, and it certainly had many features that were carried over to later designs. Apart from their caterpillar tracks these carriages had automatically-adjusting recoil mechanisms to suit all angles of elevation, hydraulic brakes and pneumatic recuperators.



The Canon de 194 mle GPF used the same chassis as the 280-mm model. While elevation was limited, the vastly increased mobility was more than adequate compensation.



The driver of the carriage sat at the front of the equipment, with the working area and rearward-facing ordnance behind him. The petrol engine was at the rear of the carriage, below the elevating gear.

Specification

Canon de 194 mle GPF
Calibre: 194 mm (7.64 in)
Length of barrel: 6.50 m (21 ft 3.9 in)
Weight: in action 29600 kg (65,257 lb)
Elevation: 0° to +37°
Traverse: 55°
Muzzle velocity: 725 m (2,379 ft) per second
Maximum range: 20900 m (22,855 yards)
Shell weight: 78.83 kg (173.8 lb)